United States
Department of
Agriculture

Soil
Conservation
Service

In cooperation with
United States Department
of Agriculture, Forest
Service; Michigan
Department of
Agriculture; Michigan
Agricultural Experiment
Station; and Michigan
Technological University

Soil Survey of Chippewa County, Michigan

How To Use This Soil Survey

General Soil Map

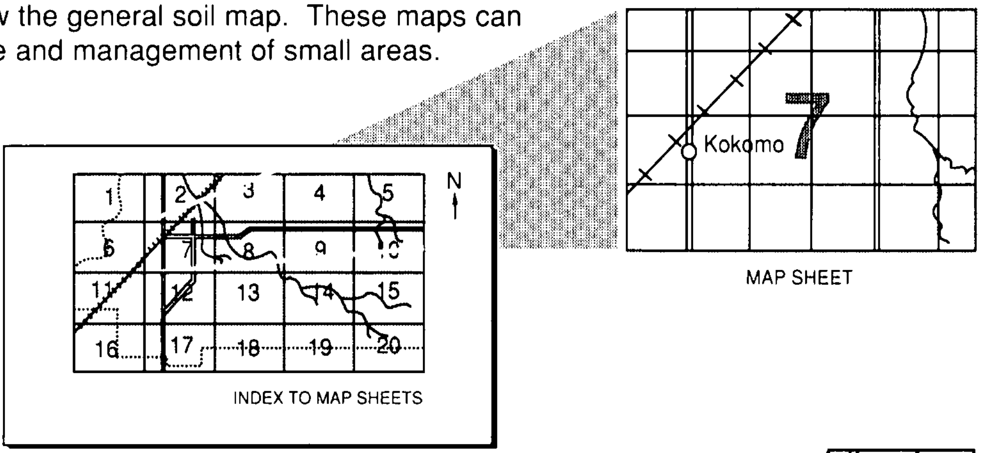
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

To find information about your area of interest, locate that area on the map, identify the name of the map unit in the area on the color-coded map legend, then refer to the section **General Soil Map Units** for a general description of the soils in your area.

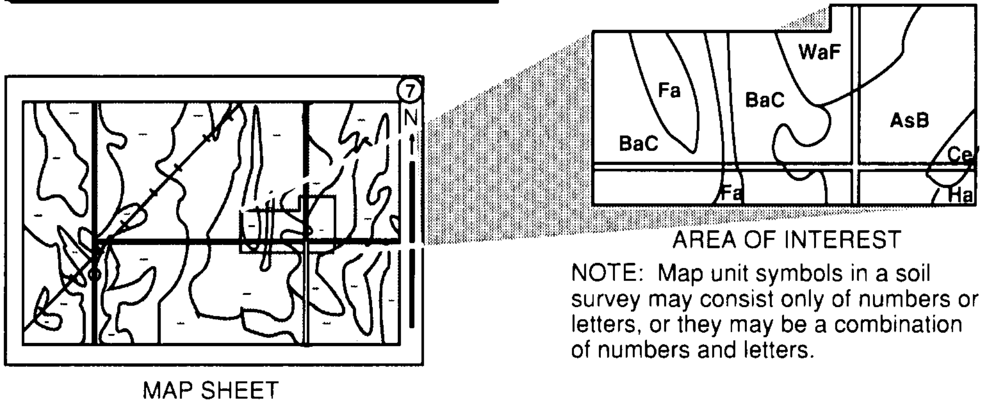
Detailed Soil Maps

The detailed soil maps follow the general soil map. These maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**, which precedes the soil maps. Note the number of the map sheet, and turn to that sheet.



Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Index to Map Units** (see Contents), which lists the map units by symbol and name and shows the page where each map unit is described.



NOTE: Map unit symbols in a soil survey may consist only of numbers or letters, or they may be a combination of numbers and letters.

The **Summary of Tables** shows which table has data on a specific land use for each detailed soil map unit. See **Contents** for sections of this publication that may address your specific needs.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in 1988. Soil names and descriptions were approved in 1989. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1988. This survey was made cooperatively by the Soil Conservation Service, the Forest Service, the Michigan Department of Agriculture, the Michigan Agricultural Experiment Station, and the Michigan Technological University. It is part of the technical assistance furnished to the Chippewa County Soil Conservation District. Financial assistance was provided by the Chippewa County Board of Commissioners.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

All programs and services of the Soil Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: The lower falls on the Tahquamenon River are an important tourist attraction in Chippewa County, where tourism is a major part of the local economy.

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Foreword

This soil survey contains information that can be used in land-planning programs in Chippewa County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

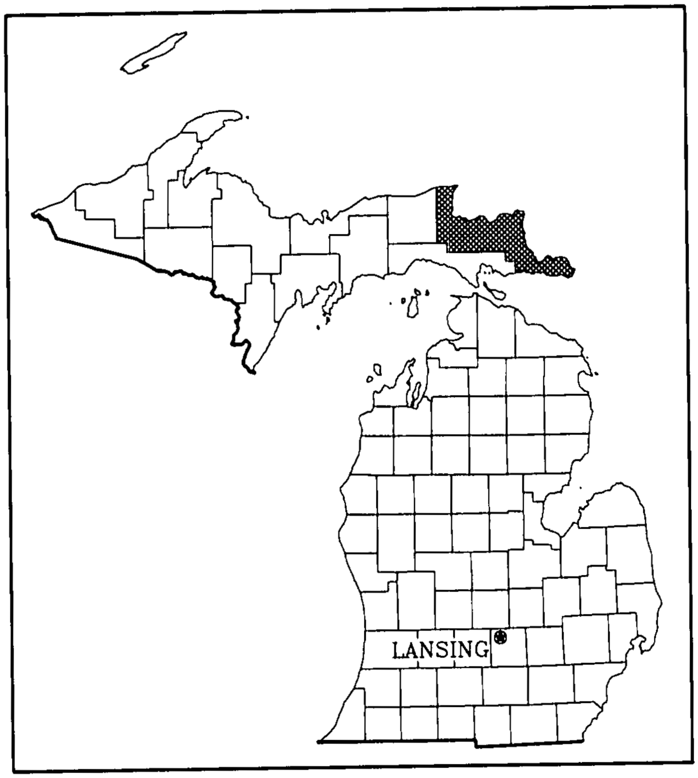
This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Homer R. Hilner

Homer R. Hilner
State Conservationist
Soil Conservation Service



Location of Chippewa County in Michigan.

Soil Survey of Chippewa County, Michigan

By Gregory D. Whitney, Soil Conservation Service

Fieldwork by Gregory D. Whitney, William Anzalone, Martin L. Kroell III,
Stephen E. Rodock, and Richard Neilson, Soil Conservation Service; and Larry Perreault
and Karl Hausler, Michigan Department of Agriculture

United States Department of Agriculture, Soil Conservation Service and Forest Service,
in cooperation with
Michigan Department of Agriculture, Michigan Agricultural Experiment Station, and
Michigan Technological University

CHIPPEWA COUNTY is in the northeastern part of the Upper Peninsula of Michigan. The International Bridge over the St. Mary's River connects Chippewa County to Ontario, Canada. The county has a land area of 1,017,728 acres, or approximately 1,590 square miles, including 98 islands in the St. Mary's River system. In 1984, the population of the county was 28,819 and that of Sault Ste. Marie, the county seat, was 13,941.

The county has 62 different soil types. The soils vary widely in texture, natural drainage, slope, and other characteristics. Well drained and moderately well drained soils make up about 24 percent of the county, somewhat poorly drained soils make up about 20 percent, and poorly drained and very poorly drained soils make up about 56 percent.

This survey updates the soil survey of Chippewa County published in 1927 *(10)*. It provides additional information and larger maps, which show the soils in greater detail.

General Nature of the County

This section gives general information about the survey area. It describes climate, history and development, geology and physiography, farming, and lakes and streams.

Climate

Prepared by the Michigan Department of Agriculture, Environmental Division/Climatology Program, East Lansing, Michigan.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Whitefish Point in the period 1952 to 1980 and at Sault Ste. Marie and Dunbar in the period 1951 to 1980. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring as recorded at Sault Ste. Marie and Whitefish Point. Table 3 provides data on length of the growing season as recorded at Sault Ste. Marie and Whitefish Point.

In winter, the average temperature is 18.5 degrees F at Whitefish Point, 15.7 degrees at Sault Ste. Marie, and 16.4 degrees at Dunbar and the average daily minimum temperature is 11.5 degrees at Whitefish Point, 7.8 degrees at Sault Ste. Marie, and 7.2 degrees at Dunbar. The lowest temperature on record is -30 degrees at Whitefish Point, -37 degrees at Sault Ste. Marie, and -39 degrees at Dunbar. In summer, the average temperature is 59.4 degrees at Whitefish Point, 61.6 degrees at Sault Ste. Marie, and 62.5 degrees at Dunbar and the average daily maximum temperature is 69.4 degrees at Whitefish Point, 72.9 degrees at Sault Ste. Marie, and 73.7 degrees at Dunbar.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is 34.75 inches at Whitefish Point, 33.48 inches at Sault Ste. Marie, and 31.94 inches at Dunbar. Of these totals, 17.49 inches at Whitefish Point, 18.9 inches at Sault Ste. Marie, and 19.25 inches at Dunbar usually fall in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 14.0 inches at Whitefish Point, 13.8 inches at Sault Ste. Marie, and 15.9 inches at Dunbar. The heaviest 1-day rainfall during the period of record was 3.95 inches at Whitefish Point, 5.92 inches at Sault Ste. Marie, and 3.71 inches at Dunbar. Thunderstorms occur on about 27 to 29 days each year.

The average seasonal snowfall is 129.2 inches at Whitefish Point, 114.7 inches at Sault Ste. Marie, and 99.0 inches at Dunbar. The greatest snow depth at any one time during the period of record was 58 inches at Whitefish Point, 50 inches at Sault Ste. Marie, and 44 inches at Dunbar. On the average, 145 days at Whitefish Point, 135 days at Sault Ste. Marie, and 133 days at Dunbar have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The heaviest 1-day snowfall on record was more than 16 inches at Whitefish Point, 14.3 inches at Sault Ste. Marie, and 12 inches at Dunbar. The greatest monthly snowfall was 71.7 inches at Whitefish Point, 53.2 inches at Sault Ste. Marie, and 46.3 inches at Dunbar. The greatest total seasonal snowfall was 241 inches at Whitefish Point, 178.6 inches at Sault Ste. Marie, and 143 inches at Dunbar. The smallest total seasonal snowfall was 69.5 inches at Whitefish Point, 65.5 inches at Sault Ste. Marie, and 50.2 inches at Dunbar.

Based on data recorded at Sault Ste. Marie, the average relative humidity in midafternoon is about 67 percent. Humidity is higher at night, and the average at dawn is about 85 percent. The sun shines 60 percent of the time possible in summer and 36 percent in winter. The prevailing wind is from the west-northwest. Average wind speed is highest, 10.5 miles per hour, in April.

History and Development

Chippewa County is among the oldest settled areas in the United States. As many as 2,000 years before it was settled by Europeans, the area's abundant water and fish resources were utilized by the Chippewa Indians. The Sault Ste. Marie area was one of the most important Indian communities in the Midwest. The area was first documented by the French explorer Etienne Brul, who landed in 1618 at the present site of Sault Ste. Marie. He was soon followed by French fur traders making their way into the Great Lakes country.

In 1668, the first European settlement in Michigan was established at Sault Ste. Marie by the French Jesuit missionary, Father Jacques Marquette. By 1751, a fort had been built there. The British took possession of the area in 1792. They continued to occupy the area and traded there until after the War of 1812. The British presence was expanded in 1815, when a fort was established on Drummond Island. The fort was abandoned in 1822, when the Michigan Territorial Governor, Lewis Cass, brought the area under American control. Fort Brady was constructed by the U.S. Army in 1823 at Sault Ste. Marie.

Logging, fishing, and farming resulted in economic expansion in the county from the mid-1800's to the early 1900's. Large-scale logging activities began in the 1870's on virgin white pine stands, and many of the towns in the county began as logging centers. Farming started soon afterward and increased slowly until 1925, when the number of farms peaked at 1,730. Although agriculture is still an important economic activity in the county, the number of farms had declined to 378 by 1982. The lumber industry also declined as the virgin forest was cut over, but a second growth forest still provides an important source of employment.

Commercial shipping on the Great Lakes created a need for a canal between Lake Superior and the St. Mary's River system, which leads to Lake Huron. In 1852, Congress provided a land grant to finance a canal and lock system at Sault Ste. Marie. This system, the Soo Locks, was operational by 1855 and was later enlarged and improved by the U.S. Army Corps of Engineers. It is now the busiest such system in the world.

Population growth in the county was very slow after the turn of the century. As a result of slow industrial development and out-migration, the population has declined since 1960.

Geology and Physiography

Chippewa County was completely covered by a series of glaciers during the Pleistocene Epoch *(15)*. The present topography and soil material in the county resulted from glacial deposits of the Wisconsin Glacier, which was the last glacier to cover this area and which melted 10,000 to 12,000 years ago.

The topography is controlled by the presence of bedrock, glacial moraines, outwash plains, lake plains, eolian deposits, organic deposits, and other lacustrine features, such as water-worked deposits and abandoned shorelines.

Both sandstone (Cambrian Age) and dolomitic limestone (Silurian Age) are exposed in the county. The sandstone outcrops are in the northern part of the county along Lake Superior, around Salt Point and Naomikong Point. They also occur at the Lower Falls of the Tahquamenon River. The limestone outcrops are in the southeastern part of the county, particularly on Drummond Island. One active limestone quarry is on Drummond Island, and several small abandoned quarries are also in the county. The Maxton Plains on Drummond Island is a unique area of shallow soils over bedrock and exposed limestone bedrock. This area supports a wide variety of rare prairie vegetation (fig. 1). Outcrops of limestone also occur in the Stalwart and Rockview areas.

The glacial moraines in the northwestern part of the county, around McNeary Lake, are rolling to steep, uneven, knob-like hills and depressions. These moraines are derived from coarse textured material. The moraines in the southeastern part of the county and on Sugar and Neebish Islands are level to steep hills and flat plains with compact, coarse and medium textured material. Other moraine-like features in the county include isolated level to rolling hills and knobs of medium and coarse textured material, which are surrounded by lacustrine deposits. These isolated hills and knobs begin southeast of Sault Ste. Marie and continue southward to Kinross.

The outwash plain begins north of Strongs Corners and continues south and east of Raco, where it blends into the lake plain. The soils on the outwash plain are coarse textured.

The lake plain begins in Sault Ste. Marie and extends south past Pickford and west to the outwash plain. The soils on the lake plain are fine textured. In areas where the outwash plain and the lake plain blend, the soils generally have coarser textured deposits over the fine textured material.

Other features in the county that influence topography and soil material are eolian deposits, organic deposits, shorelines from previous glacial lakes, and water-worked materials.

The eolian sand deposits are most common in the northern part of the county from Whitefish Point along the shore to the Shallows. The soils in these areas are associated with organic deposits.

Organic deposits occur throughout the county. They are deep or are underlain by coarse or fine textured material. Some areas of these deposits, such as the Betchler Swamp and the old cranberry bogs of Vermillion, have very few trees; the Gogomain Swamp, however, has very thick tree growth.

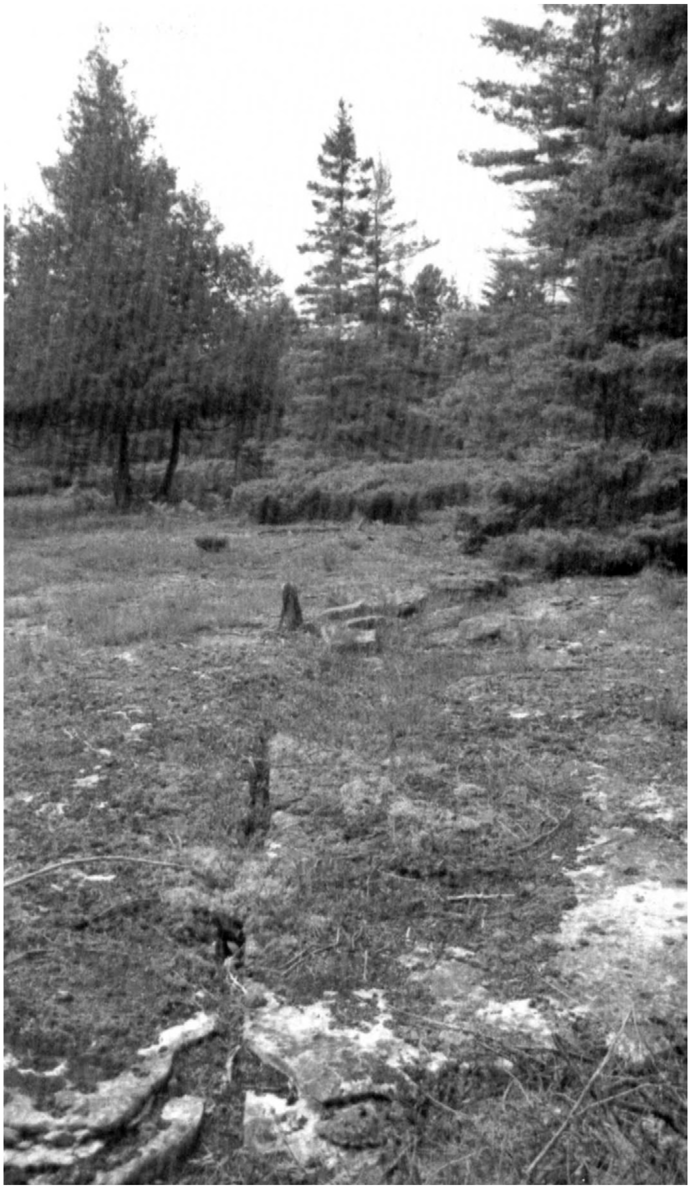


Figure 1.—Limestone bedrock on the Maxon Plains in an area of Potagannissing-Rock outcrop complex, 0 to 3 percent slopes.

Chippewa County was influenced by two major glacial lake levels, Lake Algonquin and Lake Nipissing. The Algonquin Lake stage formed the lake plain. Remnant shorelines of this lake stage can be seen at Rockview and north of Strongs Corner. The Nipissing Lake stage is a prominent, steep bluff that can be seen from Naomikong Point along the Curly Lewis Highway to Iroquois Point. Remnant shorelines from this stage can be seen on Ashman Hill in Sault Ste. Marie.

All of these features have influenced the soils and topography of the county. Many of these areas have been reworked by water, resulting in a wide variety of coarse, medium, and fine textured soils.

Farming

Farming is a relatively recent practice in Chippewa County, even though Sault Ste. Marie is one of the oldest settlements in the state. In 1880, about 117 farms were in the area *(6)*. This number increased to about 1,730 farms in 1925. The number of farms has decreased since 1925 and is now about 378. Most farms are in trefoil-grass hay production, but pasture and livestock are also important. In 1982, about 70,000 acres were farmland *(5)*. Other crops grown in the county are oats, barley, wheat, trefoil seed, and corn. A few farms raise specialty crops, such as raspberries, strawberries, and apples. A cheese factory near Rudyard is an outlet for milk from area dairy farmers. Honey is also produced in the county.

Lakes and Streams

Chippewa County is bordered by Lake Superior, Lake Huron, and the St. Mary's River system. There are over 400 miles of shoreline and over 100 inland lakes. The county has many streams and rivers, and several artesian wells are in the eastern part. The major rivers are the Charlotte, Hendrie, Munuscong, and Pine Rivers, the Tahquamenon River and its east branch, and the Waiska River.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soil on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

Survey Procedures

The general procedures followed in making this survey are described in the National Soils Handbook and the *Soil Survey Manual (11)* of the Soil Conservation Service.

Before traversing the landscape, the soil scientists compared each map sheet to the U.S. Geological Survey topographic map for the area and stereoscopically plotted preliminary boundaries of slopes and landforms on leaf-off aerial photographs. Some traverses were made by truck or trail bike on the existing network of roads and trails, but most were made on foot. Most were made at intervals of about one-tenth mile. Traverses or random observations were made at closer intervals in areas of high variability.

Soil examinations along the traverses were made wherever obvious soil boundaries were crossed. Observations of such items as landforms, blowndown trees, vegetation, roadbanks, and rock outcrops were made without regard to spacing. Soil boundaries were determined on the basis of soil examinations, landscape and vegetation observations, and photo interpretations. The soil material was examined with the aid of a hand auger or a spade to a depth of 5 feet. The pedons described as typical were observed and studied in small excavations of about 3 feet by 4 feet in area and about 5 feet in depth.

Samples for chemical and physical analyses were taken from the sites of the typical pedon for some of the major soils in the survey area. The analyses were made by the Soil Research Laboratory, Michigan Technological University, Houghton, Michigan, and by the Soil Survey Investigations Staff, Soil Conservation Service, Lincoln, Nebraska. The results of the analyses are stored in a computerized data file at the laboratories. The results and the laboratory procedures can be obtained on request from the laboratories.

The descriptions, names, and delineations of soils in this soil survey do not fully agree with those in the surveys of adjacent areas. Differences are the result of a better knowledge of soils, modifications in series concepts, and variations in the intensity of mapping or in the extent of the soils within the survey areas.

General Soil Map Units

The general soil map at the back of this publication shows the soil associations in this survey area. Each association has a distinctive pattern of soils, relief, and drainage. Each is a unique natural landscape. Typically, an association consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one association can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building or other structure. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Soil Descriptions

Nearly Level to Very Steep Soils That Are Poorly Drained to Well Drained

Most areas of these soils are used as cropland, hayland, or pasture. Some areas are wooded. The soils are suited to cropland and pasture. If cultivated crops are grown, water erosion is a hazard on the steeper slopes. Removing excess surface water and maintaining good tilth are management concerns.

The major concerns in managing woodland are the equipment limitation on wet soils and on soils that have a slope of more than 18 percent. Seedling mortality and windthrow are management concerns on the very wet soils. Plant competition also is a concern.

Most of these soils are poorly suited to building site development because of wetness and slope. They are generally unsuited to septic tank absorption fields because of wetness, restricted permeability, and slope. Most of the soils are suited to sewage lagoons.

1. Pickford-Rudyard-Ontonagon Association

Very deep, nearly level to very steep, poorly drained to well drained, loamy soils on lake plains

The Pickford soils in this association are in broad low areas and in drainageways and depressions and are frequently ponded. In some areas they are occasionally flooded. The Rudyard soils are on broad plains or are slightly higher on the landscape than the Pickford soils. The Ontonagon soils are on the higher knolls and ridges.

This association makes up about 17 percent of the county. It is about 50 percent Pickford and similar soils, 25 percent Rudyard and similar soils, 15 percent Ontonagon soils, and 10 percent soils of minor extent (fig. 2).

Pickford soils are poorly drained. They have a slope of 0 to 2 percent. Typically, the surface layer is very dark gray silty clay loam about 8 inches thick. The subsoil is about 14 inches of weak red, mottled, firm and very firm silty clay and clay. The substratum to a depth of about 60 inches is reddish brown, mottled clay.

Rudyard soils are somewhat poorly drained. They have a slope of 0 to 3 percent. Typically, the surface layer is brown silty clay loam about 6 inches thick. The subsoil is about 11 inches thick. It is mottled and firm. The upper part is brown and gray silty clay loam and silt loam, and the lower part is reddish brown clay. The substratum to a depth of about 60 inches is reddish brown, mottled clay.

Ontonagon soils are moderately well drained and well drained. They have a slope of 2 to 50 percent. Typically, the surface layer is very dark grayish brown silt loam about 3 inches thick. The subsoil is about 20 inches thick. The upper part is reddish brown and brown, friable silt loam and silty clay; the next part is reddish brown, firm clay; and the lower part is reddish brown, mottled, firm clay. The substratum to a depth of about 60 inches is reddish brown, mottled clay.

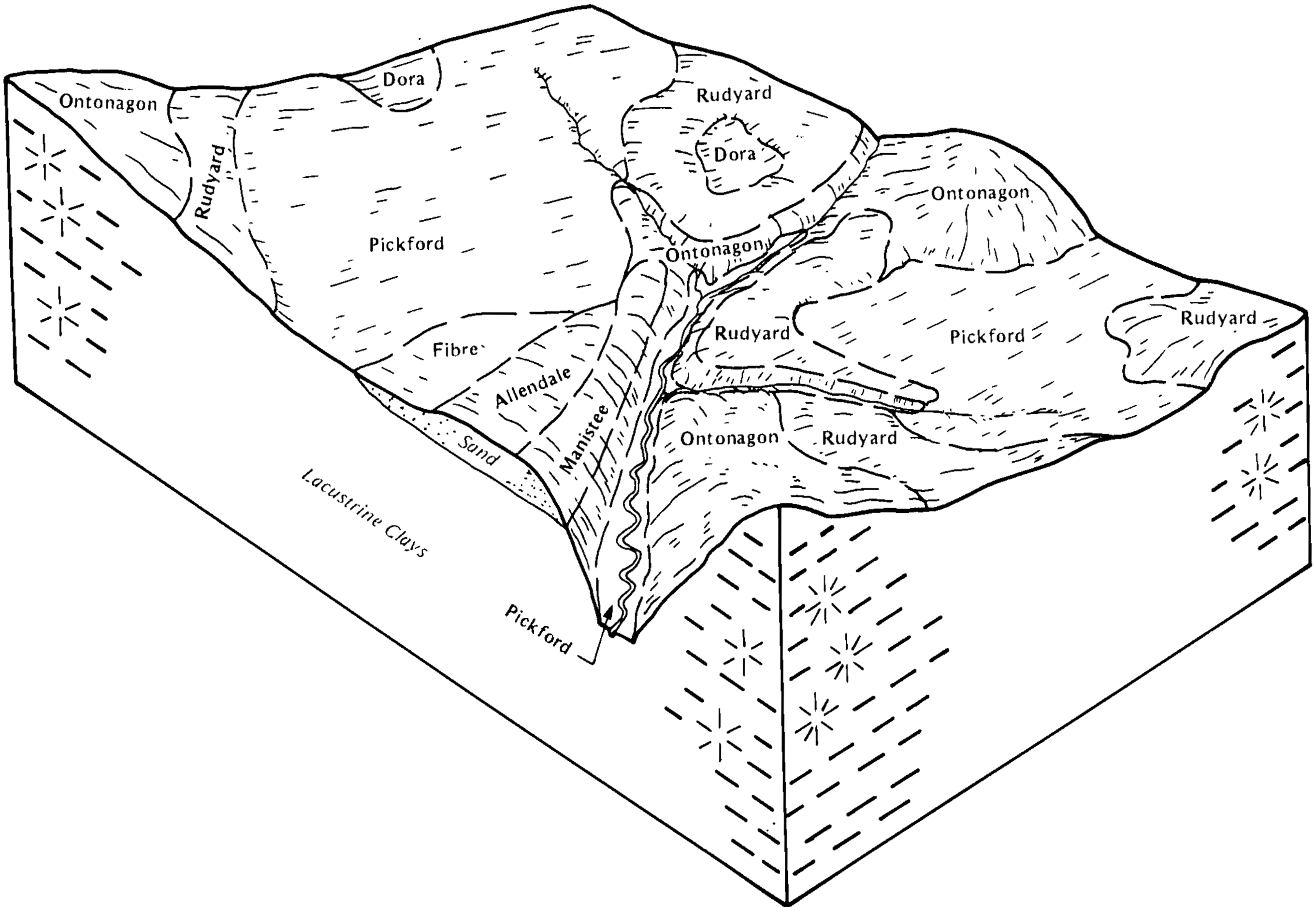


Figure 2.—Typical pattern of soils and parent material in the Pickford-Rudyard-Ontonagon association.

Of minor extent in this association are the well drained Amasa and Manistee soils, the somewhat poorly drained Allendale soils, the poorly drained Fibre soils, and the very poorly drained Dora soils. Amasa soils are coarser textured throughout than the major soils, and Manistee soils are coarser textured in the upper part. Both of these soils are in landscape positions similar to those of the Ontonagon soils. Allendale soils are coarser textured in the upper part than the major soils. They are in landscape positions similar to those of the Rudyard soils. Dora soils formed in 16 to 50 inches of organic material, and Fibre soils are coarser textured in the upper part than the major soils. Both of these soils are in landscape positions similar to those of the Pickford soils.

The major soils are used mainly as cropland, hayland, or pasture. In some areas they are used as woodland. The wetness of the Pickford and Rudyard soils, the erosion hazard in the steeper areas of the Ontonagon soils, and restricted permeability in all the major soils are the main problems affecting most uses. A high shrink-swell potential also is a problem.

The major soils are fairly well suited to cropland. They are well suited to pasture. Wetness is the main limitation in wooded areas of the Pickford and Rudyard soils. The slope is the main limitation in areas of the Ontonagon soils. The major soils are poorly suited or generally unsuited to building site development and septic tank absorption fields. They are well suited, fairly well suited, or poorly suited to sewage lagoons.

2. Pickford-Rudyard-Posen Association

Very deep, nearly level to rolling, poorly drained, somewhat poorly drained, and well drained, loamy soils on lake plains and ground moraines

The Pickford soils in this association are in broad low areas and in drainageways and depressions and are frequently ponded. In some areas they are occasionally flooded. The Rudyard soils are on broad plains or are slightly higher on the landscape than the Pickford soils. The Posen soils are on the higher knobs.

This association makes up about 3 percent of the county. It is about 35 percent Pickford and similar soils, 20 percent Rudyard and similar soils, 20 percent Posen and similar soils, and 25 percent soils of minor extent.

Pickford soils are poorly drained. They have a slope of 0 to 2 percent. Typically, the surface layer is very dark gray silty clay loam about 8 inches thick. The subsurface layer is dark gray, mottled silty clay loam about 2 inches thick. The subsoil is about 14 inches of weak red, mottled, firm and very firm silty clay and clay. The substratum to a depth of about 60 inches is reddish brown, mottled clay.

Rudyard soils are somewhat poorly drained. They have a slope of 0 to 3 percent. Typically, the surface layer is brown silty clay loam about 6 inches thick. The subsoil is about 11 inches thick. It is mottled and firm. The upper part is brown and gray silty clay loam and silt loam, and the lower part is reddish brown clay. The substratum to a depth of about 60 inches is reddish brown, mottled clay.

Posen soils are well drained. They have a slope of 1 to 15 percent. Typically, the surface is covered by about 1 inch of partially decomposed leaf litter. The surface layer is very dark gray stony fine sandy loam about 3 inches thick. The subsoil is dark brown and brown, friable stony and very cobbly silt loam about 13 inches thick. The substratum to a depth of about 60 inches is brown very gravelly fine sandy loam.

Of minor extent in this association are the well drained and moderately well drained Velvet soils, the somewhat poorly drained Wega and Solona soils, the poorly drained Ermatinger soils, and the very poorly drained Dora and Markey soils. Velvet soils are coarser textured than the major soils and have more surface stones. They are in landscape positions similar to or slightly higher than those of the Posen soils. Ermatinger, Wega, and Solona soils are coarser textured than the major soils. Wega and Solona soils are in landscape positions similar to those of the Rudyard soils. Ermatinger soils are in landscape positions similar to those of the Pickford soils. Dora and Markey soils formed in 16 to 50 inches of organic material. They are in landscape positions similar to or slightly lower than those of the Pickford soils.

The major soils are used mainly as woodland. Some areas are used as cropland or pasture. The wetness and restricted permeability in the Pickford and Rudyard soils and the surface stones on the Posen soils are the major problems affecting most uses. A high shrink-swell potential also is a problem.

The major soils are fairly well suited or generally unsuited to cropland. They are well suited or fairly well suited to pasture. Wetness is the main limitation in wooded areas of the Pickford and Rudyard soils. The number of large stones is the main limitation on the Posen soils.

The Pickford and Rudyard soils are poorly suited or generally unsuited to building site development and septic tank absorption fields. The Posen soils are fairly well suited to these uses. The Pickford and Rudyard soils are well suited to sewage lagoons, but the Posen soils are unsuited.

Nearly Level to Very Steep Soils That Are Excessively Drained, Somewhat Excessively Drained, Somewhat Poorly Drained, Poorly Drained, and Very Poorly Drained

Most areas of these soils are used as woodland. The major concern in managing woodland is the equipment limitation on wet soils and on soils that have a slope of more than 18 percent. Seedling mortality and windthrow are management concerns on the wet soils. Plant competition also is a concern.

The somewhat excessively drained and excessively drained soils are suited to building site development, but the slope is a limitation in some areas. Most of the soils are poorly suited to septic tank absorption fields because of a poor filtering capacity and wetness. The soils readily absorb but do not adequately filter the effluent in septic tank absorption fields. The poor filtering capacity can result in the pollution of ground water. The soils are generally unsuited to sewage lagoons.

3. Kalkaska-Au Gres-Kinross Association

Very deep, nearly level to very steep, somewhat excessively drained, somewhat poorly drained, and poorly drained, sandy and mucky soils on outwash plains, ground moraines, and lake plains

The Kalkaska soils in this association are on upland plains, ridges, and knobs. The Au Gres soils are in broad low areas and in swales and depressions. The Kinross soils are in landscape positions similar to or slightly lower than those of the Au Gres soils or are in depressions and drainageways. They are frequently ponded.

This association makes up about 4 percent of the county. It is about 30 percent Kalkaska and similar soils, 20 percent Au Gres and similar soils, 20 percent Kinross and similar soils, and 30 percent soils of minor extent.

Kalkaska soils are somewhat excessively drained. They have a slope of 0 to 60 percent. Typically, the surface is covered by about 1 inch of partially decomposed leaf litter. The surface layer is dark reddish brown sand about 2 inches thick. The subsurface layer is reddish brown sand about 5 inches thick. The subsoil is about 24 inches thick. The upper part is dark reddish brown, friable loamy sand, and the lower part is dark brown and strong brown, very friable and loose sand. The substratum to a depth of about 60 inches is yellowish brown sand.

Au Gres soils are somewhat poorly drained. They have a slope of 0 to 3 percent. Typically, the surface is covered by about 1 inch of well decomposed leaf litter. The surface layer is black sand about 1 inch thick. The subsurface layer is pinkish gray sand about 4 inches thick. The subsoil is sand about 19 inches thick. It is mottled. The upper part is yellowish red and very friable, and the lower part is strong brown and loose. The substratum to a depth of about 60 inches is brownish yellow and light yellowish brown, mottled sand.

Kinross soils are poorly drained. They have a slope of 0 to 2 percent. Typically, the surface layer is black muck about 5 inches thick. The subsurface layer is brown sand about 5 inches thick. The subsoil is dark brown and brown, mottled, very friable and loose sand about 32 inches thick. The substratum to a depth of about 60 inches is grayish brown sand.

Of minor extent in this association are the excessively drained Rubicon soils; the well drained Superior soils; the moderately well drained Alcona, Croswell, and Manistee soils; and the somewhat poorly drained Allendale and Gaastra soils. Rubicon, Superior, Alcona, and Manistee soils are in landscape positions similar to those of the Kalkaska soils. Rubicon soils are not so well developed in the subsoil as the major soils. Superior and Alcona soils are finer textured throughout than the major soils, and Manistee soils are finer textured in the lower part. Croswell soils are in landscape positions similar to or slightly lower than those of the Kalkaska soils. Allendale soils are finer textured in the lower part than the major soils, and Gaastra soils are finer textured throughout. Both of these soils are in landscape positions similar to those of the Au Gres soils. Markey soils formed in 16 to 50 inches of organic material. They are in landscape positions similar to or slightly lower than those of the Kinross soils.

The major soils are used as woodland. Seedling mortality, plant competition, and the equipment limitation resulting from wetness or a slope of more than 18 percent are the main concerns in managing woodland. Windthrow is a hazard in wet areas.

The Kalkaska soils are well suited to building site development, but the slope is a limitation in some areas. The Au Gres and Kinross soils are poorly suited or unsuited to building site development. All of the major soils are poorly suited or unsuited to septic tank absorption fields and sewage lagoons because of a poor filtering capacity and wetness.

4. Deer Park-Dawson-Au Gres Association

Very deep, nearly level to rolling, excessively drained, very poorly drained, and somewhat poorly drained, sandy and peaty soils on outwash plains, lake plains, and beach ridges

The Deer Park soils in this association are on upland plains, ridges, and knobs. The Dawson soils are in swamps and bogs and are frequently ponded. The Au Gres soils are on low knolls and ridges and in nearly level areas adjacent to the Dawson soils.

This association makes up about 5 percent of the county. It is about 35 percent Deer Park and similar soils, 25 percent Dawson and similar soils, 20 percent Au Gres and similar soils, and 20 percent soils of minor extent (fig. 3).

Deer Park soils are excessively drained. They have a slope of 0 to 15 percent. Typically, the surface layer is very dark gray fine sand about 1 inch thick. The subsurface layer is light brownish gray fine sand about 7 inches thick. The subsoil is yellowish brown and reddish yellow, loose fine sand about 43 inches thick. The substratum to a depth of about 60 inches is light brown sand.

Dawson soils are very poorly drained. They have a slope of less than 2 percent. Typically, the surface layer is yellowish brown sphagnum moss about 6 inches thick. The underlying organic layers are dark reddish brown muck about 12 inches thick. The upper part of the substratum is dark brown and pinkish gray fine sand about 1 inch thick. The lower part to a depth of about 60 inches is dark reddish brown, dark brown, and strong brown loamy fine sand and fine sand.

Au Gres soils are somewhat poorly drained. They have a slope of 0 to 3 percent. Typically, the surface is covered by about 1 inch of well decomposed leaf litter. The surface layer is black sand about 1 inch thick. The subsurface layer is pinkish gray sand about 4 inches thick. The subsoil is sand about 19 inches thick. It is mottled. The upper part is yellowish red and very friable, and the lower part is strong brown and loose. The substratum to a depth of about 60 inches is brownish yellow and light yellowish brown, mottled sand.

Of minor extent in this association are the moderately well drained Croswell soils and the poorly drained Kinross soils. Croswell soils are in landscape positions similar to or slightly lower than those of the Deer Park soils. Kinross soils are in landscape positions similar to or slightly higher than those of the Dawson soils.

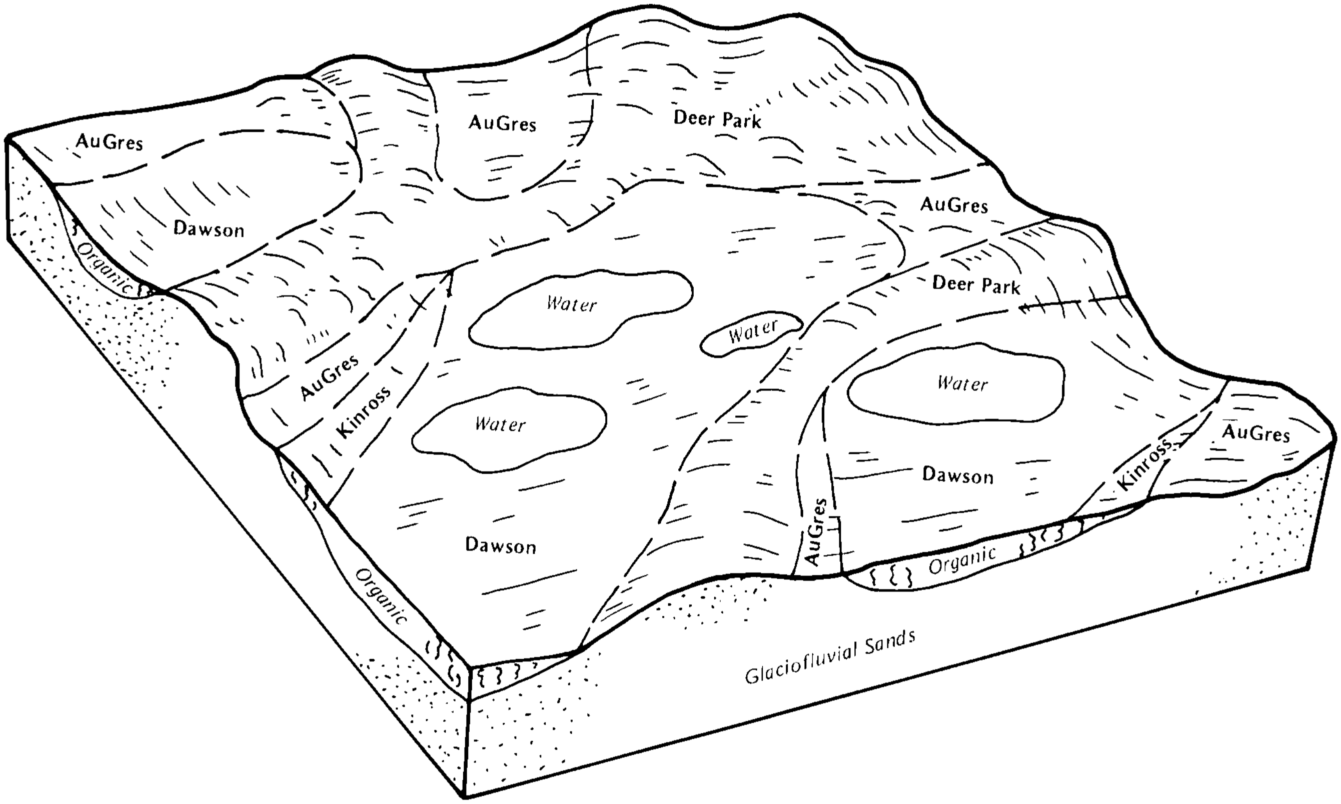


Figure 3.—Typical pattern of soils and parent material in the Deer Park-Dawson-Au Gres association.

The major soils are used as woodland. Seedling mortality, plant competition, and the equipment limitation resulting from wetness are the main concerns in managing woodland. Windthrow is a hazard in wet areas.

The Deer Park soils are well suited to building site development, but the slope is a limitation in some areas. The Dawson and Au Gres soils are poorly suited or unsuited to building site development. All of the major soils are poorly suited or unsuited to septic tank absorption fields and sewage lagoons because of a poor filtering capacity and wetness.

Rock Outcrop and Nearly Level to Very Steep Soils That Are Somewhat Poorly Drained and Well Drained

Most areas of these soils are used as woodland. Some areas are used as cropland or pasture. The soils are poorly suited or generally unsuited to cropland. Wetness, surface stones, and shallowness to bedrock are the main limitations in areas of cropland and pasture.

The major concerns in managing woodland are the equipment limitation resulting from wetness, a slope of more than 18 percent, surface stones, and exposed bedrock. Windthrow and plant competition also are concerns.

Most of these soils are poorly suited to building site development and septic tank absorption fields because of wetness, surface stones, and shallowness to bedrock. The soils are generally unsuited to sewage lagoons.

5. Shelter-Posen-Summerville Association

Very deep and shallow, nearly level to very steep, somewhat poorly drained and well drained, loamy soils on ground moraines and glacial lake benches

The Shelter soils in this association are on broad plains, knolls, low ridges, and the sides of ridges. The Posen and Summerville soils are in landscape positions similar to or slightly higher than those of the Shelter soils.

This association makes up about 9 percent of the county. It is about 35 percent Shelter and similar soils, 25 percent Posen and similar soils, 25 percent Summerville and similar soils, and 15 percent soils of minor extent.

Shelter soils are somewhat poorly drained. They have a slope of 0 to 15 percent. Typically, the surface layer is black very stony loam about 4 inches thick. The next layer is very dark gray and dark brown very cobbly loam about 2 inches thick. The subsoil is light yellowish brown mottled, friable very cobbly fine sandy loam about 6 inches thick. The substratum to a depth of about 60 inches is light brownish gray, mottled very cobbly fine sandy loam.

Posen soils are well drained. They have a slope of 1 to 35 percent. Typically, the surface is covered by about 1 inch of partially decomposed leaf litter. The surface layer is very dark gray stony fine sandy loam about 3 inches thick. The subsoil is dark brown and brown, friable stony and very cobbly silt loam about 13 inches thick. The substratum to a depth of about 60 inches is brown very gravelly fine sandy loam.

Summerville soils are well drained. They have a slope of 1 to 45 percent. Typically, the surface layer is very dark grayish brown loam about 3 inches thick. The subsoil is dark yellowish brown very fine sandy loam about 10 inches thick. Limestone bedrock is at a depth of about 13 inches.

Of minor extent in this association are the excessively drained Alpena soils, the poorly drained Ermatinger and Beavertail soils, and the very poorly drained Markey soils. Alpena soils are coarser textured throughout than the major soils. They are in landscape positions similar to those of the major soils. Markey soils are in low depressions and drainageways. Also of minor extent are areas of limestone rock outcrop. These occur as flat areas or vertical drops of 5 to 25 feet.

The major soils are used mainly as woodland. Some areas are used as cropland or pasture. These soils are poorly suited or unsuited to cropland and pasture. Wetness, stoniness, and the depth to bedrock are the major problems affecting these uses. The equipment limitation resulting from wetness, stoniness, or a slope of more than 18 percent is the main problem in wooded areas.

These soils are poorly suited or generally unsuited to building site development and septic tank absorption fields because of the wetness, the stoniness, and the depth to bedrock. They are generally unsuited to sewage lagoons because of the wetness and the depth to bedrock.

6. Potagannissing-Rock Outcrop-Summerville Association

Exposed limestone bedrock and shallow and very shallow, nearly level to very steep, somewhat poorly drained and well drained, loamy soils on ground moraines and glacial lake benches

The Potagannissing soils in this association are on broad flats and ridgetops. They are lower on the landscape than the Summerville soils. The Rock outcrop occurs as exposed bedrock on broad flats or in vertical drops of 5 to 25 feet.

This association makes up about 2 percent of the county. It is about 35 percent Potagannissing and similar soils, 35 percent Rock outcrop, 20 percent Summerville and similar soils, and 10 percent soils of minor extent.

Potagannissing soils are somewhat poorly drained. They have a slope of 0 to 3 percent. Typically, the surface layer is very dark gray gravelly silt loam about 4 inches thick. The substratum is yellowish brown, mottled gravelly fine sandy loam about 3 inches thick. Limestone bedrock is at a depth of about 7 inches.

Summerville soils are well drained. They have a slope of 1 to 45 percent. Typically, the surface layer is very dark grayish brown loam about 3 inches thick. The subsoil is dark yellowish brown very fine sandy loam about 10 inches thick. Limestone bedrock is at a depth of about 13 inches.

Of minor extent in this association are the well drained Longrie soils, the somewhat poorly drained Shelter soils, and the poorly drained Ruse soils. Longrie soils are deeper over bedrock than the major soils. They are in landscape positions similar to those of the Summerville soils. Shelter soils do not have bedrock within a depth of 40 inches. They are on broad flats and low ridges. Ruse soils are in low areas and depressions.

The major soils are used as woodland. The equipment limitation resulting from wetness, the exposed bedrock, or a slope of more than 18 percent is the main problem in wooded areas.

These soils are unsuited to building site development, septic tank absorption fields, and sewage lagoons because of the wetness and the depth to bedrock.

Nearly Level to Very Steep Soils That Are Excessively Drained to Well Drained

Most areas of these soils are used as woodland. Some areas are used as cropland or pasture. The soils are suited to cropland and pasture. If cultivated crops are grown, soil blowing and drought are hazards. Also, water erosion is a hazard on the steeper slopes.

The major concerns in managing woodland are the equipment limitation on soils that have a slope of more than 18 percent. Seedling mortality is a management concern on the sandy soils.

These soils are suited to building site development, but the slope is a limitation in some areas. Most of the soils readily absorb but do not adequately filter the effluent in septic tank absorption fields. The poor filtering capacity can result in the pollution of ground water.

7. Kalkaska-Rubicon Association

Very deep, nearly level to very steep, somewhat excessively drained and excessively drained, sandy soils on outwash plains and ground moraines

The Kalkaska and Rubicon soils in this association are on broad plains, ridges, and knolls.

This association makes up about 14 percent of the county. It is about 45 percent Kalkaska and similar soils, 40 percent Rubicon and similar soils, and 15 percent soils of minor extent.

Kalkaska soils are somewhat excessively drained. They have a slope of 0 to 60 percent. Typically, the surface is covered by about 1 inch of partially decomposed leaf litter. The surface layer is dark reddish brown sand about 2 inches thick. The subsurface layer is reddish brown sand about 5 inches thick. The subsoil is about 24 inches thick. The upper part is dark reddish brown, friable loamy sand, and the lower part is dark brown and strong brown, very friable and loose sand. The substratum to a depth of about 60 inches is yellowish brown sand.

Rubicon soils are excessively drained. They have a slope of 0 to 35 percent. Typically, the surface is covered by about 1 inch of partially decomposed leaf litter. The surface layer is very dark gray sand about 1 inch thick. The subsurface layer is grayish brown sand about 2 inches thick. The subsoil is brown and yellowish brown sand about 17 inches thick. The substratum to a depth of about 60 inches is light brown sand.

Of minor extent in this association are the moderately well drained Alcona, Croswell, and Manistee soils; the somewhat poorly drained Au Gres soils; the poorly drained Kinross soils; and the very poorly drained Markey soils. Alcona soils are finer textured throughout than the major soils, and Manistee soils are finer textured in the lower part. Both of these soils are in landscape positions similar to those of the major soils. Croswell soils are in the slightly lower landscape positions. Au Gres and Kinross soils are on low flats and in depressions. Markey soils are in depressions and drainageways.

The major soils are used as woodland. Seedling mortality is the main limitation. The slope is a limitation in areas where it exceeds 18 percent.

These soils are well suited to building site development, but the slope is a limitation in some areas. The soils are poorly suited to septic tank absorption fields and sewage lagoons because of a poor filtering capacity and because of the slope in some areas.

8. Kalkaska-Emmet Association

Very deep, nearly level to very steep, somewhat excessively drained and well drained, sandy and loamy soils on outwash plains and ground moraines

The Kalkaska and Emmet soils in this association are on broad plains and knolls. In some areas the Kalkaska soils are on the higher ridges.

This association makes up 1 percent of the county. It is about 45 percent Kalkaska and similar soils, 30 percent Emmet and similar soils, and 25 percent soils of minor extent.

Kalkaska soils are somewhat excessively drained. They have a slope of 0 to 60 percent. Typically, the surface is covered by about 1 inch of partially decomposed leaf litter. The surface layer is dark reddish brown sand about 2 inches thick. The subsurface layer is reddish brown sand about 5 inches thick. The subsoil is about 24 inches thick. The upper part is dark reddish brown, friable loamy sand, and the lower part is dark brown and strong brown, very friable and loose sand. The substratum to a depth of about 60 inches is light yellowish brown sand.

Emmet soils are well drained. They have a slope of 1 to 15 percent. Typically, the surface layer is black sandy loam about 6 inches thick. The subsoil is brown and reddish brown, friable sandy loam about 23 inches thick. The substratum to a depth of about 60 inches is reddish brown sandy loam that has thin lenses of brown loamy sand.

Of minor extent in this association are the well drained Longrie and Summerville soils, the moderately well drained Menominee soils, and the very poorly drained Markey soils. Menominee, Longrie, and Summerville soils are in landscape positions similar to those of the major soils. Longrie and Summerville soils are less than 40 inches deep over bedrock. Menominee soils are sandy in the upper part and loamy in the lower part. Markey soils are in depressions and drainageways.

The major soils generally are used as woodland. Some areas are used as cropland or pasture. The Emmet soils are well suited, fairly well suited, or poorly suited to cultivated crops and pasture, depending on the slope. The Kalkaska soils are poorly suited or unsuited to cropland and pasture. Water erosion on the Emmet soils and droughtiness in the Kalkaska soils are the major management concerns. Seedling mortality and the equipment limitation on the steeper slopes are the major concerns in managing woodland.

These soils are well suited to building site development, but the slope is a limitation in some areas. The nearly level to rolling areas of Emmet soils are fairly well suited to septic tank absorption fields.

The restricted permeability is the main limitation in these areas. The steep and very steep areas are poorly suited to septic tank absorption fields because of the slope. The Kalkaska soils are poorly suited to septic tank absorption fields because of a poor filtering capacity and because of the slope in some areas.

9. Pence-Kalkaska Association

Very deep, nearly level to very steep, well drained and somewhat excessively drained, sandy soils on outwash plains

The Pence and Kalkaska soils in this association are on broad plains, ridges, and knolls.

This association makes up about 5 percent of the county. It is about 45 percent Pence and similar soils, 40 percent Kalkaska and similar soils, and 15 percent soils of minor extent.

Pence soils are well drained. They have a slope of 0 to 35 percent. Typically, the surface layer is black loamy sand about 1 inch thick. The subsurface layer is brown loamy sand about 3 inches thick. The subsoil is about 24 inches thick. The upper part is dark reddish and dark brown, very friable sandy loam, and the lower part is strong brown, loose sand and coarse sand. The substratum to a depth of about 60 inches is strong brown gravelly coarse sand.

Kalkaska soils are somewhat excessively drained. They have a slope of 0 to 60 percent. Typically, the surface is covered by about 1 inch of partially decomposed leaf litter. The surface layer is dark reddish brown sand about 2 inches thick. The subsurface layer is reddish brown sand about 5 inches thick. The subsoil is about 24 inches thick. The upper part is dark reddish brown, friable loamy sand, and the lower part is dark brown and strong brown, very friable and loose sand. The substratum to a depth of about 60 inches is yellowish brown sand.

Of minor extent in this association are the well drained Alcona and Amasa soils and the moderately well drained Halfaday soils. Alcona and Amasa soils are in landscape positions similar to those of the major soils. Alcona soils are finer textured throughout than the major soils, and Amasa soils have a thicker loamy mantle and have more gravel in the substratum. Halfaday soils are in the slightly lower landscape positions.

The major soils are used as woodland. The equipment limitation and seedling mortality are the main limitations. The slope is a limitation in areas where it exceeds 18 percent.

These soils are well suited to building site development, but the slope is a limitation in some areas. The soils are poorly suited to septic tank absorption fields and sewage lagoons because of a poor filtering capacity and because of the slope in some areas.

Nearly Level to Very Steep Soils That Are Well Drained to Poorly Drained

Most areas of these soils are used as woodland. The major concern in managing woodland is the equipment limitation resulting from wetness, a slope of more than 18 percent, or stoniness. Seedling mortality and windthrow are management concerns on the wet soils. Plant competition also is a concern.

The well drained soils are suited to building site development, but the slope and the stoniness are limitations in some areas. Most of the soils are poorly suited to septic tank absorption fields because of the wetness, slope, stoniness, restricted permeability, and a poor filtering capacity. The soils are generally unsuited to sewage lagoons.

10. Alcona-Ingalls-Manistee Association

Very deep, nearly level to very steep, well drained, moderately well drained, and somewhat poorly drained, sandy soils on outwash plains, lake plains, and ground moraines

The Manistee and Alcona soils in this association are on broad plains, ridges, and knolls. The Ingalls soils are on low plains and in swales.

This association makes up about 6 percent of the county. It is about 30 percent Alcona and similar soils, 25 percent Ingalls and similar soils, 20 percent Manistee and similar soils, and 25 percent soils of minor extent.

Alcona soils are well drained and moderately well drained. They have a slope of 0 to 50 percent. Typically, the surface is covered by about 1 inch of undecomposed hardwood leaf litter. The surface layer is brown loamy very fine sand about 3 inches thick. The subsoil is about 52 inches thick. The upper part is dark reddish brown, yellowish brown, and brownish yellow, very friable very fine sandy loam and loamy very fine sand, and the lower part is light yellowish brown to strong brown, very friable loamy fine sand and mottled very fine sandy loam. The substratum to a depth of about 60 inches is yellowish brown and strong brown, mottled, stratified silt, silt loam, very fine sand, and loamy very fine sand. It has thin bands of silty clay loam.

Ingalls soils are somewhat poorly drained. They have a slope of 0 to 3 percent. Typically, the surface is covered by about 3 inches of well decomposed leaf litter. The surface layer is brown loamy sand about 7 inches thick. The subsoil is about 33 inches thick. It is mottled. The upper part is dark brown, friable loamy sand and sand, and the lower part is brown, very friable loamy fine sand. The substratum to a depth of about 60 inches is dark yellowish brown, mottled, stratified loamy fine sand and silt loam.

Manistee soils are well drained and moderately well drained. They have a slope of 0 to 50 percent. Typically, the surface is covered by about 3 inches of well decomposed leaf litter. The surface layer is pinkish gray sand about 9 inches thick. The subsoil is about 26 inches thick. It is firm. The upper part is dark reddish brown and dark brown sand, and the lower part is reddish brown and pinkish gray silty clay loam and loamy sand. The substratum to a depth of about 60 inches is reddish brown clay.

Of minor extent in this association are the somewhat excessively drained Kalkaska soils; the well drained Superior soils; the moderately well drained Ontonagon soils; the somewhat poorly drained Allendale, Gaastra, and Wega soils; and the very poorly drained Markey soils. Kalkaska soils are coarser textured in the lower part than the major soils, and Superior and Ontonagon soils are finer textured in the upper part. All three of these soils are in landscape positions similar to those of the Manistee and Alcona soils. Allendale soils are finer textured in the lower part than the Ingalls soils, and Gaastra and Wega soils are finer textured in the upper part. Both of these soils are in landscape positions similar to those of the Ingalls soils. Markey soils are in depressions and drainageways.

The major soils are used as woodland. Seedling mortality is the main limitation. Because of wetness, the equipment limitation is a concern in areas of the Ingalls soils. The slope of the Manistee and Alcona soils is a limitation in areas where it exceeds 18 percent.

The well drained soils are well suited to building site development. The major soils are poorly suited to septic tank absorption fields because of the wetness, restricted permeability, a poor filtering capacity, and the slope. They are generally unsuited to sewage lagoons.

11. Oldman-Velvet-Gay Association

Very deep, nearly level to steep, moderately well drained, well drained, and poorly drained, loamy, sandy, and mucky soils on ground moraines and end moraines

The Oldman and Velvet soils in this association are on broad plains, knolls, and ridges. In some areas the Velvet soils are on the higher ridges. The Gay soils are on low flats and in depressions and are frequently ponded.

This association makes up about 2 percent of the county. It is about 35 percent Oldman and similar soils, 25 percent Velvet and similar soils, 20 percent Gay and similar soils, and 20 percent soils of minor extent.

Oldman soils are moderately well drained. They have a slope of 2 to 6 percent. Typically, the surface is covered by about 1 inch of well decomposed leaf litter. The surface layer is black stony fine sandy loam about 4 inches thick. The subsurface layer is reddish gray stony fine sandy loam about 1 inch thick. The subsoil is about 55 inches thick. The upper part is dark reddish brown and strong brown, friable very cobbly and very gravelly fine sandy loam; the next part is reddish brown, light reddish brown, and pinkish gray, mottled, firm and very firm gravelly sandy loam; and the lower part is pinkish gray and reddish brown, mottled, friable very gravelly fine sandy loam.

Velvet soils are well drained and moderately well drained. They have a slope of 0 to 35 percent. Typically, the surface is covered by about 2 inches of well decomposed leaf litter. The surface layer is grayish brown very stony loamy sand about 3 inches thick. The subsoil is about 38 inches thick. The upper part is dark brown and strong brown, very friable and loose very stony and very cobbly loamy sand. The lower part is grayish brown and reddish brown, mottled, very firm gravelly loamy sand and gravelly fine sandy loam. The substratum to a depth of about 60 inches is brown gravelly fine sandy loam.

Gay soils are poorly drained. They have a slope of 0 to 2 percent. Typically, the surface layer is dark brown stony muck about 5 inches thick. The subsurface layer is light brownish gray, mottled stony sandy loam about 5 inches thick. The subsoil is brown and pale brown, mottled, friable sandy loam about 14 inches thick. The substratum to a depth of about 60 inches is light brown, mottled sandy loam.

Of minor extent in this association are the moderately well drained Rockbottom soils and the somewhat poorly drained Westbury soils. Rockbottom soils are finer textured in the upper part than the major soils. They are in landscape positions similar to those of the Oldman and Velvet soils. Westbury soils are slightly higher on the landscape than the Gay soils.

The major soils are used as woodland. The equipment limitation resulting from stoniness or the slope is a management concern.

These soils are poorly suited to building site development because of the stoniness, the wetness, and the slope in some areas. They are poorly suited or generally unsuited to septic tank absorption fields because of the wetness and restricted permeability. They are unsuited to sewage lagoons.

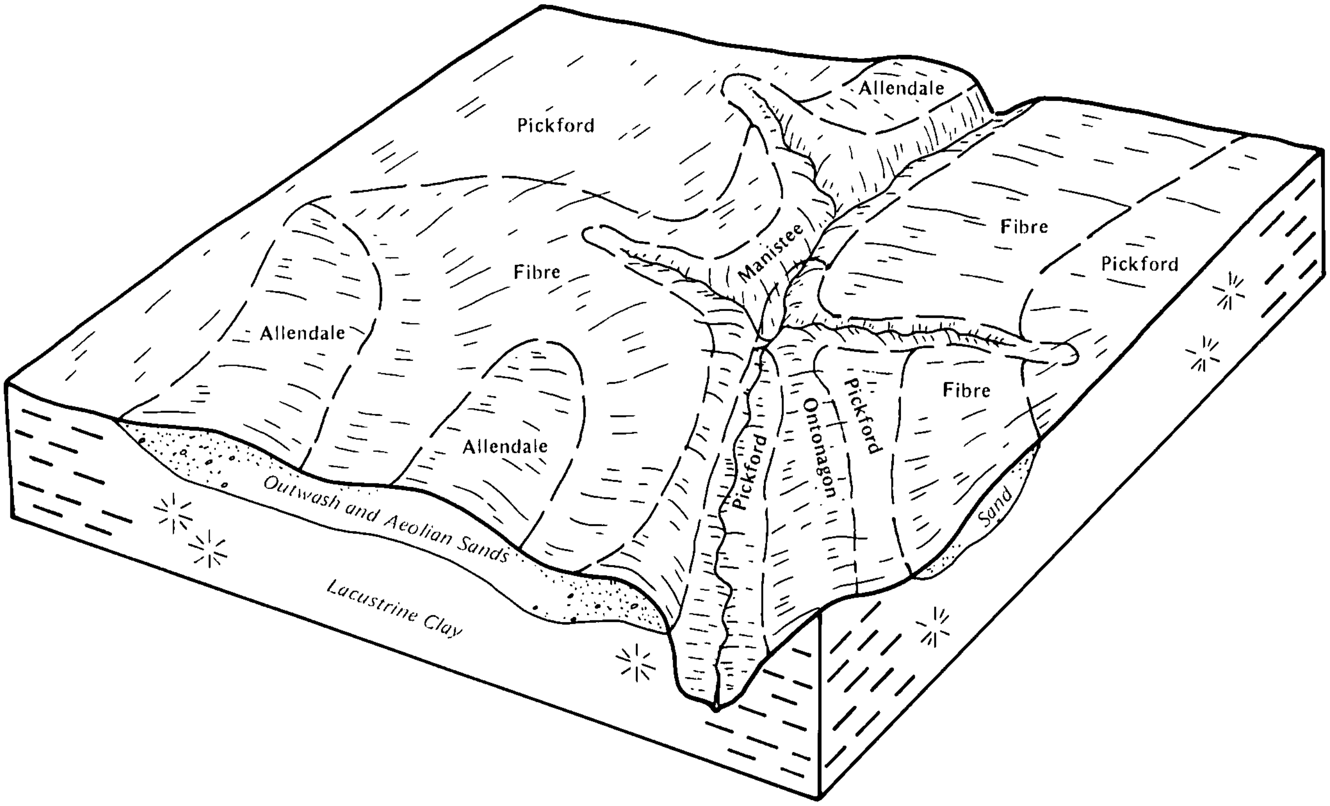


Figure 4.—Typical pattern of soils and parent material in the Fibre-Allendale-Pickford association.

Nearly Level to Undulating Soils That Are Very Poorly Drained to Moderately Well Drained

Most areas of these soils are used as woodland. Some areas are used as cropland or pasture. Some of the soils are suited to cropland and pasture, but others are generally unsuited. If cultivated crops are grown, removing excess water, controlling ponding, providing drainage outlets, and controlling soil blowing are management concerns. The major concerns in managing woodland are seedling mortality, windthrow, and the equipment limitation resulting from wetness.

These soils are generally unsuited to building site development, septic tank absorption fields, and sewage lagoons because of wetness, restricted permeability, and a poor filtering capacity.

12. Fibre-Allendale-Pickford Association

Very deep, nearly level, poorly drained and somewhat poorly drained, mucky, sandy, and loamy soils on lake plains, ground moraines, and outwash plains

The Fibre and Pickford soils in this association are on broad flats and in drainageways and depressions and are frequently ponded. The Allendale soils are in the slightly higher landscape positions or on low knobs.

This association makes up about 6 percent of the county. It is about 30 percent Fibre and similar soils, 25 percent Allendale and similar soils, 15 percent Pickford and similar soils, and 30 percent soils of minor extent (fig. 4).

Fibre soils are poorly drained. They have a slope of 0 to 2 percent. Typically, the surface layer is about 5 inches of black muck. The subsurface layer is brown sand about 8 inches thick. The subsoil is about 14 inches thick. It is mottled. The upper part is dark brown and reddish brown loamy sand and sandy loam, and the lower part is reddish brown clay. The substratum to a depth of about 60 inches is stratified, reddish brown, mottled clay that has thin bands of pinkish gray silt.

Allendale soils are somewhat poorly drained. They have a slope of 0 to 3 percent. Typically, the surface layer is black loamy fine sand about 5 inches thick. The subsurface layer is pinkish gray fine sand about 3 inches thick. The subsoil is about 27 inches thick. The upper part is dark reddish brown, very friable loamy fine sand; the next part is strong brown and yellowish brown, mottled, very friable fine sand; and the lower part is reddish brown, mottled, firm silty clay. The substratum to a depth of about 60 inches is light reddish brown, mottled silty clay stratified with yellowish brown silt loam and silty clay loam.

Pickford soils are poorly drained. They have a slope of 0 to 2 percent. Typically, the surface layer is very dark gray silty clay loam about 8 inches thick. The subsurface layer is dark gray, mottled silty clay loam about 2 inches thick. The subsoil is about 14 inches of weak red, mottled, firm and very firm silty clay and clay. The next layer is weak red, mottled clay about 8 inches thick. The substratum to a depth of about 60 inches is reddish brown, mottled clay.

Of minor extent in this association are the well drained and moderately well drained Manistee, Ontonagon, and Rousseau soils; the somewhat poorly drained Wega, Ingalls, and Wainola soils; and the poorly drained Gogomain soils. Manistee, Ontonagon, and Rousseau soils are on knobs and ridges. Wega, Ingalls, and Wainola soils are coarser textured in the lower part than the major soils. They are in landscape positions similar to those of the Allendale soils. Gogomain soils are finer textured in the upper part than the Fibre soils. They are in landscape positions similar to those of the Fibre and Pickford soils.

The major soils generally are used as woodland. Some areas are used as cropland. Some of the soils are suited to these uses, but others are generally unsuited. Removing excess water, controlling ponding, providing drainage outlets, and controlling soil blowing during dry periods are management concerns. The equipment limitation resulting from wetness is the major concern in managing woodland. Seedling mortality and windthrow also are concerns.

These soils are poorly suited to building site development and septic tank absorption fields because of wetness, restricted permeability, and a poor filtering capacity. The Pickford soils are well suited to sewage lagoons.

13. Ermatinger-Wega-Burleigh Association

Very deep, nearly level, poorly drained and somewhat poorly drained, loamy and sandy soils on lake plains and the former flood plains of glacial rivers

The Ermatinger and Burleigh soils in this association are on broad flats and are frequently ponded. The Wega soils are in similar or slightly higher positions on the landscape.

This association makes up about 2 percent of the county. It is about 40 percent Ermatinger and similar soils, 25 percent Wega and similar soils, 20 percent Burleigh and similar soils, and 15 percent soils of minor extent.

Ermatinger soils are poorly drained. They have a slope of 0 to 2 percent. Typically, the surface layer is black silt loam about 8 inches thick. The substratum extends to a depth of 60 inches or more. It is mottled. The upper part is grayish brown silt loam, and the lower part is gray and brown very fine sandy loam and loamy very fine sand.

Wega soils are somewhat poorly drained. They have a slope of 0 to 3 percent. Typically, the surface layer is very dark grayish brown very fine sandy loam about 9 inches thick. The substratum extends to a depth of 60 inches or more. It is mottled. The upper part is light yellowish brown, pale brown, and brown very fine sandy loam; the next part is strong brown and pale brown loamy very fine sand; and the lower part is pale brown and dark gray very fine sandy loam.

Burleigh soils are poorly drained. They have a slope of 0 to 2 percent. Typically, the surface layer is very dark gray loamy fine sand about 7 inches thick. The substratum extends to a depth of 60 inches or more. It is mottled. The upper part is dark gray loamy fine sand, the next part is yellowish brown fine sand, and the lower part is light brownish gray and light brown, stratified fine sand, very fine sand, and silt loam.

Of minor extent in this association are the somewhat poorly drained Ingalls soils and the poorly drained Pickford soils. Ingalls soils are coarser textured in the upper part than the major soils. They are in landscape positions similar to those of the Wega soils. Pickford soils are finer textured throughout than the major soils. They are in landscape positions similar to those of the Ermatinger and Burleigh soils.

Most areas of the major soils are used as cropland. Some areas are wooded or are covered with brush. Some of the soils are suited to cropland and woodland, but others are generally unsuited. Removing excess water, controlling ponding, providing drainage outlets, and controlling soil blowing during dry periods are management concerns. The equipment limitation resulting from wetness is the major concern in managing woodland. Seedling mortality and windthrow also are concerns.

These soils are poorly suited to building site development and septic tank absorption fields because of wetness, restricted permeability, and a poor filtering capacity.

14. Markey-Kinross-Croswell Association

Very deep, nearly level to undulating, very poorly drained, poorly drained, and moderately well drained, mucky and sandy soils on outwash plains

The Markey soils in this association are in broad depressions and drainageways, and the Kinross soils

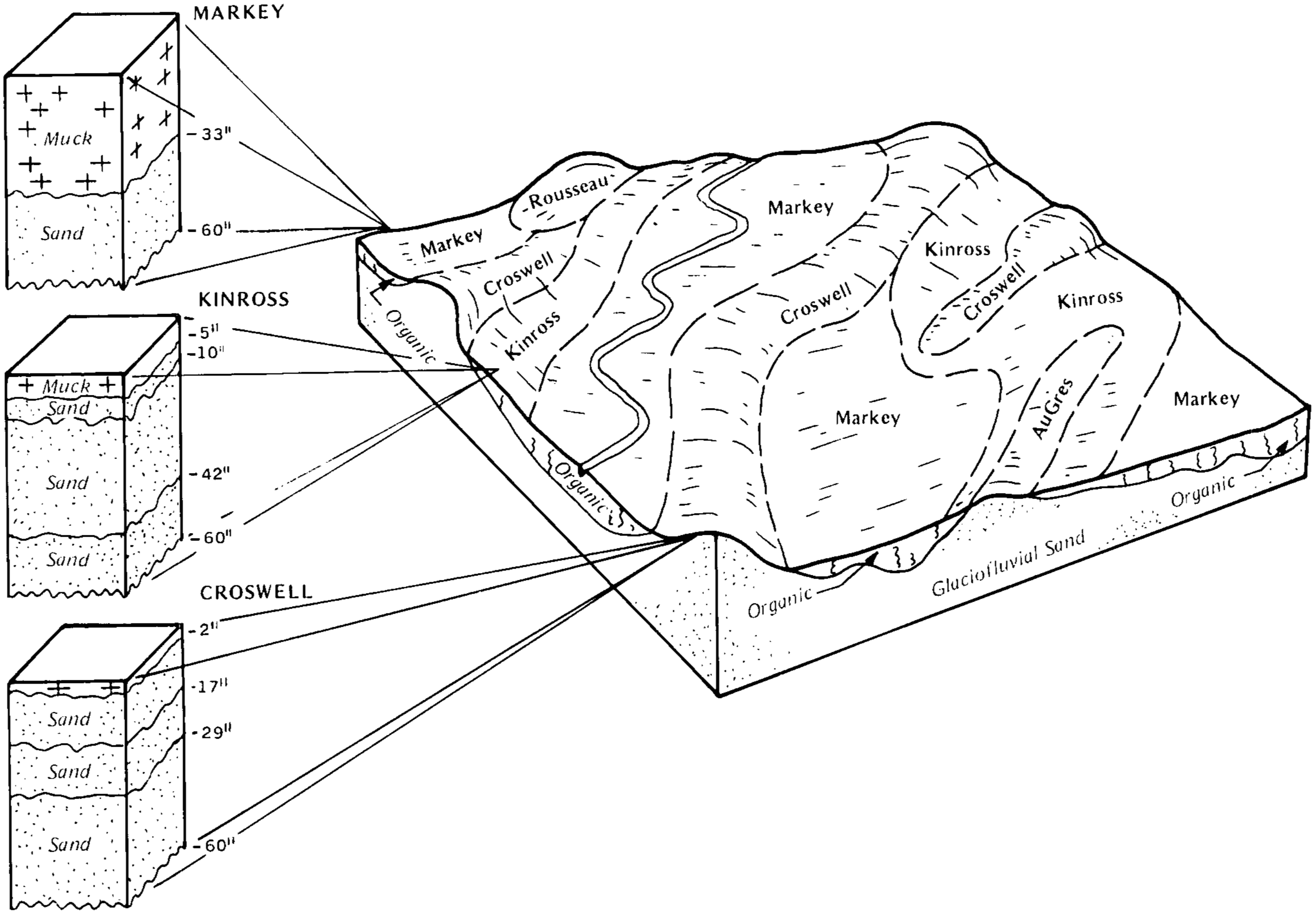

MARKEY
Muck
Sand
-33"
-60"
KINROSS
Muck
Sand
Sand
Sand
-5"
-10"
-42"
-60"
CROSWELL
Sand
Sand
Sand
-2"
-17"
-29"
-60"
Markey
Rousseau
Croswell
Kinross
Organic
Markey
Kinross
Croswell
Kinross
Croswell
Markey
AuGres
Markey
Organic
Organic
Glaciofluvial Sand

Figure 5.—Typical pattern of soils and parent material in the Markey-Kinross-Croswell association.

are on low plains and in swales and depressions. Both of these soils are frequently ponded. The Croswell soils are on broad plains and low ridges.

This association makes up 17 percent of the county. It is about 40 percent Markey and similar soils, 20 percent Kinross and similar soils, 20 percent Croswell and similar soils, and 20 percent soils of minor extent (fig. 5).

Markey soils are very poorly drained. They have a slope of less than 2 percent. Typically, the surface layer is dark reddish brown peaty muck about 3 inches thick. The underlying organic layers are black, dark brown, and dark reddish brown muck about 30 inches thick. The substratum to a depth of about 60 inches is brown sand.

Kinross soils are poorly drained. They have a slope of less than 2 percent. Typically, the surface layer is black muck about 5 inches thick. The subsurface layer is brown sand about 5 inches thick. The subsoil is dark brown and brown, mottled, very friable and loose sand about 32 inches thick. The substratum to a depth of about 60 inches is grayish brown sand.

Croswell soils are moderately well drained. They have a slope of 0 to 6 percent. Typically, the surface is covered by about 2 inches of black, partially decomposed leaf litter. The surface layer is brown sand about 2 inches thick. The subsoil is strong brown and yellowish brown, very friable and friable sand about 27 inches thick. The substratum to a depth of about 60 inches is light yellowish brown and brownish yellow, mottled sand.

Of minor extent in this association are the very poorly drained Dawson and Loxley soils; the somewhat poorly drained Wainola, Au Gres, and Allendale soils; and the well drained and moderately well drained Rousseau soils. Dawson and Loxley soils occur as areas of acid peat and muck. They are in landscape positions similar to those of the Markey soils. Allendale, Wainola, and Au Gres soils are slightly higher on the landscape than the Kinross soils. Rousseau soils are fine sand throughout.

They are in landscape positions similar to or slightly higher than those of the Croswell soils.

The major soils are used as woodland. Seedling mortality, the windthrow hazard, plant competition, and the equipment limitation resulting from wetness are management concerns on the Markey and Kinross soils. The equipment limitation, seedling mortality, and plant competition are concerns on the Croswell soils.

The Markey and Kinross soils are unsuited to building site development and onsite waste disposal systems because of wetness. The Croswell soils are fairly well suited to buildings without basements. They are poorly suited to onsite waste disposal systems because of the high water table and a poor filtering capacity.

15. Markey-Dawson Association

Very deep, nearly level, very poorly drained, mucky and peaty soils on outwash plains, lake plains, and ground moraines

The Markey soils in this association are in broad depressions, swamps, and drainageways. The Dawson soils are in swamps and bogs. Both of these soils are frequently ponded.

This association makes up about 8 percent of the county. It is about 60 percent Markey and similar soils, 30 percent Dawson and similar soils, and 10 percent soils of minor extent.

Markey soils have a slope of less than 2 percent. Typically, the surface layer is dark reddish brown peaty muck about 3 inches thick. The underlying organic layers are black, dark brown, and dark reddish brown muck about 30 inches thick. The substratum to a depth of about 60 inches is brown sand.

Dawson soils have a slope of less than 2 percent. Typically, the surface layer is yellowish brown sphagnum moss about 6 inches thick. The underlying organic layers are dark reddish brown muck about 12 inches thick. The upper part of the substratum is dark brown and pinkish gray fine sand about 1 inch thick. The lower part to a depth of about 60 inches is dark reddish brown and dark brown loamy fine sand and fine sand.

Of minor extent in this association are the somewhat poorly drained Au Gres soils, the poorly drained Kinross soils, and the moderately well drained Croswell soils. Au Gres, Croswell, and Kinross soils are sandy throughout. Au Gres and Croswell soils are on low ridges and knolls. Kinross soils are in the slightly higher landscape positions and on very low ridges and knobs.

The major soils are used as woodland or support native bog vegetation and a few trees. Seedling mortality, the windthrow hazard, plant competition, and the equipment limitation resulting from wetness and the instability of the muck are management concerns.

These soils are unsuited to building site development because of ponding and low strength. They are unsuited to onsite waste disposal systems because of seepage, ponding, excess humus, and restricted permeability.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the substratum, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the substratum. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Manistee sand, 25 to 50 percent slopes, is a phase of the Manistee series.

Some map units are made up of two or more major soils. These map units are called soil complexes or undifferentiated groups.

A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Kinross-Au Gres complex, 0 to 3 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in the mapped areas are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Dawson and Loxley peats is an undifferentiated group in this survey area.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. The map unit Dumps, limestone, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

10B—Ontonagon silt loam, 2 to 6 percent slopes. This very deep, moderately well drained, nearly level and undulating soil is on small ridges and knolls. Individual areas are irregular in shape and range from 3 to 200 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 3 inches thick. The subsoil is about 20 inches thick. The upper part is reddish brown and brown, friable silt loam and silty clay; the next part is reddish brown, firm clay; and the lower part is reddish brown, mottled, firm clay. The substratum to a depth of about 60 inches is reddish brown, mottled clay. In some places it is stratified with thin bands of silt loam and silty clay loam. In other places it is underlain by gravelly sandy loam till. In some areas the surface layer is loam or silty clay loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Rudyard and poorly drained Pickford soils in depressions and drainageways. These soils make up about 5 to 15 percent of the map unit.

Permeability is very slow in the Ontonagon soil. The available water capacity is moderate. Surface runoff is medium. The shrink-swell potential is high. A perched seasonal high water table is at a depth of 2.5 to 6.0 feet in spring.

Most areas are used as cropland or pasture. Some areas are used as woodland.

The major concerns in managing woodland are the equipment limitation, the windthrow hazard, and plant competition. The sticky and plastic qualities of this soil limit the use of equipment in spring and in other excessively wet periods. Operating equipment during these periods can result in surface compaction and damage to tree roots. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. Because of the firm subsoil, trees on this soil are shallow rooted. Some may be blown down during periods of high winds and excessive wetness. Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced. The aspen cover type is dominant on this soil. Clearcutting is common. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is fairly well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The main management needs are measures that control water erosion and maintain the organic matter content and tilth. Examples are grassed waterways, cover crops, crop residue management, additions of organic material, and a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface.

This soil is well suited to pasture and hay. Overgrazing or grazing when the soil is wet can cause surface compaction, destroy forage plants, and increase the susceptibility to erosion. The forage species that can tolerate wetness, such as trefoil-grass mixtures, should be selected for planting. Proper stocking rates, rotation grazing, and restricted grazing during wet periods help to keep the pasture in good condition and prevent excessive erosion.

This soil is poorly suited to building site development because of the high shrink-swell potential. The seasonal high water table is a limitation on sites for buildings with basements. The soil is generally unsuited to septic tank absorption fields because of the very slow permeability and the wetness. It is fairly well suited to sewage lagoons. The lagoon site will require some leveling and banking. On sites for buildings, the foundation trench should be widened and backfilled with suitable coarse textured material, which reduces the shrink-swell potential. If buildings with basements are constructed, the site should be raised and a drainage system should be installed to remove excess water.

The woodland ordination symbol is 2C, the land capability classification is IIIe, and the Michigan soil management group is Oa. The primary habitat type is TAM, and the secondary habitat type is ATD.

10D—Ontonagon silt loam, 6 to 15 percent slopes. This very deep, moderately well drained, gently rolling and rolling soil is on the sides of ridges and on side slopes along streams and drainageways. Many areas are dissected by shallow drainageways. Individual areas are irregularly shaped or elongated and range from 3 to 200 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 3 inches thick. The subsoil is about 20 inches thick. The upper part is reddish brown and brown, friable silt loam and silty clay; the next part is reddish brown, firm clay; and the lower part is reddish brown, mottled, firm clay. The substratum to a depth of about 60 inches is reddish brown, mottled clay. In some places it is stratified with thin bands of silt loam and silty clay loam. In other places the surface layer and the next layer are coarser textured. In some areas the surface layer is loam or silty clay loam.

Included with this soil in mapping are small areas of the poorly drained Pickford soils in drainageways. These soils make up about 5 to 15 percent of the map unit.

Permeability is very slow in the Ontonagon soil. The available water capacity is moderate. Surface runoff is rapid. The shrink-swell potential is high. A perched seasonal high water table is at a depth of 2.5 to 6.0 feet in spring.

Most areas are used as woodland. Some of the acreage is cropland, pasture, or idle grassland.

The major concerns in managing woodland are the equipment limitation, the windthrow hazard, and plant competition. The slope limits the number of sites that are suitable for logging roads and landings. Landings can be located in small nearly level areas in this unit, if available, or in the nearly level adjacent areas. The sticky and plastic qualities of this soil limit the use of equipment in spring and in other excessively wet periods. Operating equipment during these periods can result in surface compaction and damage to tree roots. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. Because of the firm subsoil, trees on this soil are shallow rooted. Some may be blown down during periods of high winds and excessive wetness. Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced. Aspen and, in some areas, northern hardwoods are the dominant cover types. Species preference can be managed by selective cutting. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is fairly well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management needs are measures that control water erosion and maintain the organic matter content and tilth. Grassed waterways, cover crops, and close-growing crops help to control runoff and erosion. Contour farming and contour stripcropping slow runoff. Returning crop residue to the soil, applying a system of conservation tillage, and adding organic material improve tilth and increase the content of organic matter.

This soil is fairly well suited to pasture and hay. Overgrazing or grazing when the soil is wet causes surface compaction, destroys forage plants, and increases the susceptibility to erosion. The forage species that can tolerate wetness, such as trefoil-grass mixtures, should be selected for planting. Proper stocking rates and rotation grazing help to keep the pasture in good condition and prevent excessive erosion.

This soil is poorly suited to building site development because of the high shrink-swell potential. The seasonal high water table is a limitation on sites for buildings with basements. Where it exceeds 8 percent, the slope is a limitation on sites for buildings and septic tank absorption fields. The soil is generally unsuited to septic tank absorption fields because of the wetness and the very slow permeability. It is poorly suited to sewage lagoons because of the slope. The lagoon site will require leveling and banking. On sites for buildings, the foundation trench should be widened and backfilled with suitable coarse textured material, which reduces the shrink-swell potential. The buildings should be designed so that they conform to the natural slope of the land. Land shaping is necessary in some areas.

The woodland ordination symbol is 2C, the land capability classification is IIIe, and the Michigan soil management group is Oa. The primary habitat type is TAM, and the secondary habitat type is ATD.

10F—Ontonagon silt loam, 25 to 50 percent slopes. This very deep, well drained, steep and very steep soil is on side slopes along streams and drainageways. Many areas are dissected by shallow drainageways. Individual areas are irregularly shaped or elongated and range from 3 to 500 acres in size.

Typically, the surface layer is dark brown silt loam about 7 inches thick. The subsoil is about 25 inches thick. The upper part is reddish brown and brown, friable silty clay and silt loam, and the lower part is reddish brown and grayish brown, firm clay. The substratum to a depth of about 60 inches is reddish brown and grayish brown, varved clay. In some places it is stratified with thin bands of silt loam and silty clay loam. In other places the surface layer is loam or silty clay loam.

Included with this soil in mapping are small areas of the well drained Manistee and poorly drained Pickford soils. Manistee soils are sandy in the surface layer and in the upper part of the subsoil. They are in landscape positions similar to those of the Ontonagon soil. Pickford soils are in drainageways. Included soils make up about 5 to 15 percent of the map unit.

Permeability is very slow in the Ontonagon soil. The available water capacity is moderate. Surface runoff is rapid. The shrink-swell potential is high.

This soil is used as woodland. The major management concerns are the equipment limitation, the erosion hazard, the windthrow hazard, and plant competition. Access is limited by the slope. Special care is needed in laying out logging roads and in operating equipment. The roads can be designed so that they conform to the natural slope of the land. Special logging methods, such as yarding with a cable, may be needed to minimize surface disturbance. Erosion can result from the concentration of runoff on roads, in the tracks of wheeled equipment, and on landings. Removing water with water bars, out-sloping road surfaces, culverts, and drop structures minimizes erosion. Landings should be located on the less sloping nearby soils. Because of the firm subsoil, trees on this soil are shallow rooted. Some may be blown down during periods of high winds and excessive wetness. Windthrow can be minimized by harvest methods that do not leave the remaining trees widely spaced. The aspen cover type is dominant on this soil, but some areas support northern hardwoods. The opportunities for planting are limited because of the slope. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is generally unsuited to building site development, septic tank absorption fields, and sewage lagoons because of the slope.

The woodland ordination symbol is 2R, the land capability classification is VIIe, and the Michigan soil management group is 0a. The primary habitat type is TAM, and the secondary habitat type is ATD.

11A—Rudyard silty clay loam, 0 to 3 percent slopes. This very deep, somewhat poorly drained, nearly level soil is on broad plains. Individual areas are irregular in shape and range from 5 to 900 acres in size.

Typically, the surface layer is brown silty clay loam about 6 inches thick. The subsoil is about 11 inches thick. It is mottled and firm. The upper part is brown and gray silty clay loam and silt loam, and the lower part is reddish brown clay. The substratum to a depth of about 60 inches is reddish brown, mottled clay. In places it is varved or stratified with thin bands of silt loam and silty clay loam.

Included with this soil in mapping are small areas of the poorly drained Pickford soils in depressions and drainageways. These soils make up about 10 to 15 percent of the map unit.

Permeability is very slow in the Rudyard soil. The available water capacity is moderate. Surface runoff is slow. The shrink-swell potential is high. A perched seasonal high water table is at a depth of 0.5 foot to 1.5 feet from late fall to late spring.

Most areas are used as cropland or pasture. Some areas are used as woodland. Some areas of abandoned farmland are reverting to speckled alder and willow.

The major concerns in managing woodland are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. The wetness and the sticky and plastic qualities of the subsoil limit the use of equipment to dry summer months or to winter months when the snow cover is adequate. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. Culverts are needed. The use of landing sites is restricted to periods when the soil is dry or frozen. Landings should be stabilized so that they can withstand the repeated use of heavy equipment. Selection of special planting stock, such as containerized seedlings, and special site preparation that protects the surface with thin layers of loose slash can reduce the seedling mortality rate. Because of the high water table, trees on this soil are shallow rooted. Many may be blown down during periods of high winds. The aspen cover type is dominant on this soil. Clearcutting is common. After the trees are cut, plant competition can delay natural regeneration.

This soil is fairly well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management needs are measures that remove excess water during wet periods, minimize surface compaction, and maintain the organic matter content and tilth. Shallow surface ditches can help to remove excess water if adequate outlets are available. Erosion-control structures may be needed where surface ditches enter outlet drainageways. Working the soil when it is wet results in surface compaction and the formation of clods. Crop residue management and a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface can improve tilth and increase the content of organic matter.

This soil is well suited to pasture and hay. Overgrazing or grazing when the soil is wet causes surface compaction and destroys forage plants. The forage species that can tolerate wetness, such as trefoil-grass mixtures, should be selected for planting. Proper stocking rates, rotation grazing, and restricted grazing during wet periods help to keep the pasture in good condition.

This soil is poorly suited to building site development because of the wetness and the high shrink-swell potential. It is generally unsuited to septic tank absorption fields because of the wetness and the very slow permeability. It is well suited to sewage lagoons. On sites for buildings, the foundation trench should be widened and backfilled with suitable coarse textured material, which reduces the shrink-swell potential. The building site should be raised, and a drainage system should be installed to remove excess water.

The woodland ordination symbol is 6W, the land capability classification is IIIw, and the Michigan soil management group is 0b. The primary habitat type is TTP.

12—Pickford silty clay loam. This very deep, poorly drained, nearly level soil is on broad plains and in drainageways and depressions. It is frequently ponded. Individual areas are irregular in shape and range from 5 to several thousand acres in size.

Typically, the surface layer is very dark gray silty clay loam about 8 inches thick. The subsurface layer is dark gray, mottled silty clay loam about 2 inches thick. The subsoil is about 14 inches of weak red, mottled, firm and very firm silty clay and clay. The substratum to a depth of about 60 inches is reddish brown, mottled clay. In some places it is varved or stratified with thin bands of silt loam and silty clay loam. In other places the surface layer is fine sand to fine sandy loam. In some areas the soil has 3 to 8 inches of muck on the surface.

Included with this soil in mapping are small areas of the somewhat poorly drained Rudyard soils on low knolls and ridges. Also included are small areas of the poorly drained Fibre and Gogomain soils in landscape positions similar to those of the Pickford soil. Fibre soils have a sandy surface layer and subsoil. Gogomain soils have a loamy surface layer and subsoil. Included soils make up about 5 to 15 percent of the map unit.

Permeability is very slow in the Pickford soil. The available water capacity is moderate. Surface runoff is very slow or ponded. The shrink-swell potential is moderate. A perched seasonal high water table is 1 foot above to 1 foot below the surface from fall to early summer.

Most areas are used as cropland or pasture. Some areas are wooded. Some areas of abandoned farmland are reverting to speckled alder and willow.

The major concerns in managing woodland are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. The wetness limits the use of equipment to dry summer months or to winter months when the snow cover is adequate. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. Culverts are needed. The number of suitable landing sites is severely limited because of the wetness. Because of the high water table, trees on this soil are shallow rooted. Many may be blown down during periods of high winds. The aspen cover type is dominant on this soil. Clearcutting is common. After the trees are cut, competition from wetland brush can delay or prevent natural regeneration. Trees generally are not planted on this soil because of the wetness, severe seedling mortality, and severe plant competition.

If drained, this soil is fairly well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. In undrained areas it is poorly suited to crops. The major management needs are measures that remove excess water, minimize surface compaction, and maintain tilth. Shallow surface ditches can help to remove excess water if adequate outlets are available. Erosion-control structures may be needed where surface ditches enter drainageways. Working the soil when it is wet results in surface compaction and the formation of clods. Crop residue management and a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface can improve tilth and minimize surface compaction.

This soil is well suited to pasture and hay. Overgrazing or grazing when the soil is wet causes surface compaction and destroys forage plants. The forage species that can tolerate wetness, such as trefoil-grass mixtures, should be selected for planting. Proper stocking rates, rotation grazing, and restricted grazing during wet periods help to keep the pasture in good condition.

This soil is poorly suited to building site development because of the ponding and the shrink-swell potential. It is generally unsuited to septic tank absorption fields because of the ponding and the very slow permeability. It is poorly suited to sewage lagoons. It is well suited, however, if the excavation site is properly banked and the lagoon is sealed. Building sites should be raised, and a drainage system should be installed to remove excess water. The foundation trench should be widened and backfilled with suitable coarse textured material, which reduces the shrink-swell potential.

The woodland ordination symbol is 6W, the land capability classification is IIIw, and the Michigan soil management group is 1c. The primary habitat type is TTP, and the secondary habitat type is FE.

13B—Alcona loamy very fine sand, 0 to 6 percent slopes. This very deep, moderately well drained, nearly level and undulating soil is on upland flats. Individual areas are irregular in shape and range from 5 to 300 acres in size.

Typically, the surface is covered by about 1 inch of undecomposed hardwood leaf litter. The surface layer is brown loamy very fine sand about 3 inches thick. The subsoil is about 52 inches thick. The upper part is dark reddish brown, yellowish brown, and brownish yellow, very friable very fine sandy loam and loamy very fine sand, and the lower part is light yellowish brown to strong brown, mottled, very friable loamy fine sand and very fine sandy loam. The substratum to a depth of about 60 inches is yellowish brown and strong brown, mottled, stratified silt, silt loam, very fine sand, and loamy very fine sand. It has thin bands of silty clay loam. In places the soil has 5 to 15 percent cobbles and stones on or below the surface.

Included with this soil in mapping are small areas of the somewhat excessively drained Kalkaska, well drained Ocqueoc and Rousseau, and somewhat poorly drained Gaastra soils. Kalkaska and Ocqueoc soils are in landscape positions similar to those of the Alcona soil. Kalkaska soils are sand throughout. Ocqueoc soils have a sandy surface layer and subsoil. Gaastra soils are somewhat poorly drained and are in the slightly lower landscape positions. Rousseau soils are fine sand throughout. They are in the slightly higher landscape positions. Included soils make up about 5 to 15 percent of the map unit.

Permeability and the available water capacity are moderate in the Alcona soil. Surface runoff is slow. A perched seasonal high water table is at a depth of 2.5 to 6.0 feet from late fall to late spring.

Most areas are used as woodland. A small acreage is pasture, cropland, or idle grassland.

The major concerns in managing woodland are the equipment limitation and plant competition. Trafficability may be briefly limited in spring and in other excessively wet periods. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Deep ruts tend to restrict lateral drainage, expose tree roots, and alter soil structure. Year-round logging roads should be graveled. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management needs are measures that control water erosion and soil blowing. Examples are cover crops, grassed waterways, small grain crops, buffer strips, vegetative barriers, and a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface.

This soil is well suited to pasture and hay. Overgrazing or grazing when the soil is wet can cause surface compaction, destroy forage plants, and increase the susceptibility to erosion. Proper stocking rates, rotation grazing, strip grazing, and restricted use during wet periods help to keep the pasture in good condition and prevent excessive erosion.

This soil is well suited to buildings without basements and is fairly well suited to buildings with basements. Buildings with basements can be constructed on well compacted fill material, which raises the level of the site above the water table. A drainage system helps to lower the water table. The soil is poorly suited to septic tank absorption fields because of the wetness. If a septic tank disposal system is installed, filling or mounding with suitable material can raise the site above the seasonal high water table. The soil is generally unsuited to sewage lagoons because of the wetness and seepage.

The woodland ordination symbol is 3L, the land capability classification is IIe, and the Michigan soil management group is 3a-s. The primary habitat type is ATD, and the secondary habitat type is AVO.

13D—Alcona loamy very fine sand, 6 to 15 percent slopes. This very deep, moderately well drained, gently rolling and rolling soil is on the sides of ridges, on knolls, and in ravines associated with breaks along streams. Individual areas are irregularly shaped or elongated and range from 5 to 120 acres in size.

Typically, the surface is covered by about 1 inch of undecomposed hardwood leaf litter. The surface layer is brown loamy very fine sand about 3 inches thick. The subsoil is about 52 inches thick. The upper part is dark reddish brown, yellowish brown, and brownish yellow, very friable very fine sandy loam and loamy very fine sand, and the lower part is light yellowish brown to strong brown, mottled, friable loamy very fine sand and very fine sandy loam. The substratum to a depth of about 60 inches is yellowish brown and strong brown, mottled, stratified silt, silt loam, very fine sand, and loamy very fine sand. It has thin bands of silty clay loam.

Included with this soil in mapping are small areas of the somewhat excessively drained Kalkaska and well drained Ocqueoc and Rousseau soils. Kalkaska and Ocqueoc soils are in landscape positions similar to those of the Alcona soil. Kalkaska soils are sand throughout. Ocqueoc soils have a sandy surface layer and subsoil. Rousseau soils are fine sand throughout. They are in the slightly higher landscape positions. Included soils make up about 5 to 15 percent of the map unit.

Permeability and the available water capacity are moderate in the Alcona soil. Surface runoff is slow. A perched seasonal high water table is at a depth of 2.5 to 6.0 feet from late fall to late spring.

This soil is used as woodland. The major management concerns are the equipment limitation and plant competition. Trafficability may be briefly limited in spring, in fall, and in other excessively wet periods. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Deep ruts tend to restrict lateral drainage, expose tree roots, and alter soil structure. Year-round logging roads should be graveled. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is fairly well suited to building site development. It is poorly suited to septic tank absorption fields because of the wetness. Where it exceeds 8 percent, the slope is a limitation on sites for buildings and septic tank absorption fields. The soil is generally unsuited to sewage lagoons because of seepage and the slope. Buildings should be designed so that they conform to the natural slope of the land. A drainage system helps to lower the water table. Special construction methods, such as filling or mounding with suitable material, are needed to raise septic tank absorption fields above the water table. Land shaping and installing the distribution lines across the slope generally help to ensure that the absorption field functions properly.

The woodland ordination symbol is 3L, the land capability classification is IIIe, and the Michigan soil management group is 3a-s. The primary habitat type is ATD, and the secondary habitat type is AVO.

13F—Alcona loamy very fine sand, 25 to 50 percent slopes. This very deep, well drained, steep and very steep soil is on the sides of ridges and in ravines associated with breaks along streams.

Individual areas are irregularly shaped or elongated and range from 10 to 300 acres in size.

Typically, the surface is covered by about 1 inch of undecomposed hardwood leaf litter. The surface layer is brown loamy very fine sand about 3 inches thick. The subsoil is about 52 inches of dark reddish brown, yellowish brown, and brownish yellow, very friable very fine sandy loam and loamy very fine sand. The substratum to a depth of about 60 inches is yellowish brown and strong brown, stratified silt, silt loam, very fine sand, and loamy very fine sand. It has thin bands of silty clay loam.

Included with this soil in mapping are small areas of the somewhat excessively drained Kalkaska and well drained Ocqueoc soils. These soils are in landscape positions similar to those of the Alcona soil. Ocqueoc soils have a sandy surface layer and subsoil. Kalkaska soils are sand throughout. Included soils make up about 5 to 15 percent of the map unit.

Permeability and the available water capacity are moderate in the Alcona soil. Surface runoff is medium.

This soil is used as woodland. The major management concerns are the equipment limitation, the erosion hazard, and plant competition. Access is limited by the slope. Special care is needed in laying out logging roads and in operating equipment. The roads can be designed so that they conform to the natural slope of the land. Special logging methods, such as yarding with a cable, may be needed to minimize surface disturbance. Erosion can result from the concentration of runoff on roads, in the tracks of wheeled equipment, and on landings. Removing water with water bars, out-sloping road surfaces, culverts, and drop structures minimizes erosion. Landings should be located on the less sloping nearby soils. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation. Site preparation and planting are severely limited by the slope.

This soil is generally unsuited to building site development because of the slope. It is generally unsuited to septic tank absorption fields and sewage lagoons because of the slope and seepage.

The woodland ordination symbol is 3R, the land capability classification is VIIe, and the Michigan soil management group is 3a-s. The primary habitat type is ATD, and the secondary habitat type is AVO.

14A—Gaastra silt loam, 0 to 3 percent slopes. This very deep, somewhat poorly drained, nearly level soil is on broad plains and in depressions. Individual areas are irregular in shape and range from 5 to 600 acres in size.

Typically, the surface is covered by about 2 inches of well decomposed leaf litter and live roots. The surface layer is brown and pinkish gray, mottled silt loam about 8 inches thick. The subsoil is about 33 inches thick. It is mottled and friable. The upper part is reddish brown and strong brown very fine sandy loam, the next part is light reddish brown loamy very fine sand, and the lower part is reddish brown and light reddish brown very fine sandy loam. The substratum to a depth of about 60 inches is light reddish brown and reddish brown, mottled, stratified very fine sandy loam, loamy very fine sand, and very fine sand. In places it is clay or stratified clay.

Included with this soil in mapping are small areas of the moderately well drained Alcona, poorly drained Burleigh, and somewhat poorly drained Ingalls soils. Alcona soils are on low knolls and ridges. Burleigh soils are sandy in the surface layer and in the upper part of the substratum. They are in depressions and drainageways. Ingalls soils have a sandy surface layer and subsoil. They are in landscape positions similar to those of the Gaastra soil. Included soils make up about 5 to 15 percent of the map unit.

Permeability is moderately slow in the Gaastra soil. The available water capacity is high. Surface runoff is slow. The seasonal high water table is at a depth of 1 to 2 feet from late fall to late spring. The potential for frost action is high.

Most areas are used as woodland. The major management concerns are the equipment limitation, the windthrow hazard, and plant competition. The high water table limits the use of equipment to periods when the soil is dry or has an adequate snow cover. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. Culverts are needed. The use of landing sites is restricted to periods when the soil is dry or frozen. Because of the high water table, trees on this soil are shallow rooted. Some may be blown down during periods of high winds and excessive wetness. The aspen cover type is dominant on this soil. If seedlings are planted, special harvest methods and site preparation may be needed to control undesirable plants.

This soil is well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management concern is excessive wetness. A subsurface drainage system can reduce the wetness if adequate outlets are available. Tile lines should be protected with suitable material and installed on a self-cleaning grade so that they do not become clogged with fine sand and silt.

This soil is well suited to pasture and hay. The forage species that are tolerant of wetness, such as trefoil-grass mixtures, should be selected for planting. Proper stocking rates, rotation grazing, and restricted grazing during wet periods help to keep the pasture in good condition.

This soil is poorly suited to building site development because of the wetness. It is generally unsuited to septic tank absorption fields because of the wetness and the moderately slow permeability and to sewage lagoons because of the wetness.

The woodland ordination symbol is 3W, the land capability classification is IIw, and the Michigan soil management group is 2.5b. The primary habitat type is TMC-D.

15B—Rousseau fine sand, dark subsoil, 0 to 6 percent slopes. This very deep, well drained, nearly level and undulating soil is on upland flats, ridgetops, and knolls. Individual areas are irregularly shaped or elongated and range from 3 to 1,000 acres in size.

Typically, the surface layer is black fine sand about 2 inches thick. The subsurface layer is reddish gray fine sand about 3 inches thick. The subsoil is dark reddish brown and strong brown, very friable fine sand about 15 inches thick. The substratum to a depth of about 60 inches is light brown and brown fine sand. In some areas it is mottled in the lower part.

Included with this soil in mapping are small areas of the moderately well drained Alcona and Ocqueoc soils. These soils are in landscape positions similar to those of the Rousseau soil. Ocqueoc soils have a stratified, sandy and loamy substratum. Alcona soils are finer textured throughout than the Rousseau soil. Also included are small areas of the somewhat poorly drained Wainola soils in shallow depressions and along drainageways. Included soils make up about 3 to 15 percent of the map unit.

Permeability is rapid in the Rousseau soil. The available water capacity is low. Surface runoff is slow.

Most areas are used as woodland. The major management concerns are the equipment limitation and seedling mortality. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. Northern hardwoods and red pine are the dominant cover types. Species preference can be managed by selective cutting. Some areas are clearcut. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is fairly well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management needs are measures that conserve moisture during dry periods, help to control soil blowing, and maintain the organic matter content. Examples are buffer strips, vegetative barriers, field windbreaks, and a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface.

This soil is well suited to pasture. Overgrazing during dry periods can destroy the plant cover. Proper stocking rates, rotation grazing, strip grazing, and restricted use during dry periods help to keep the pasture in good condition.

This soil is well suited to building site development. It is poorly suited to septic tank absorption fields because of a poor filtering capacity. It readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. The soil is generally unsuited to sewage lagoons because of seepage.

The woodland ordination symbol is 3S, the land capability classification is IIIs, and the Michigan soil management group is 5a. The primary habitat type is ATD, and the secondary habitat type is TM.

15D—Rousseau fine sand, dark subsoil, 6 to 15 percent slopes. This very deep, well drained, gently rolling and rolling soil is on the sides of ridges and knolls. Individual areas are irregularly shaped or elongated and range from 3 to 320 acres in size.

Typically, the surface layer is black fine sand about 2 inches thick. The subsurface layer is reddish gray fine sand about 3 inches thick. The subsoil is dark reddish brown and strong brown, very friable fine sand about 15 inches thick. The substratum to a depth of about 60 inches is light brown and brown fine sand.

Included with this soil in mapping are areas of the moderately well drained Alcona and well drained Ocqueoc soils. These soils are in landscape positions similar to those of the Rousseau soil. Ocqueoc soils have a stratified, sandy and loamy substratum. Alcona soils are finer textured throughout than the Rousseau soil. Included soils make up about 3 to 10 percent of the map unit.

Permeability is rapid in the Rousseau soil. The available water capacity is low. Surface runoff is slow.

This soil is used as woodland. The major management concerns are the equipment limitation and seedling mortality. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. Landings can be located in the nearly level areas that may be included in this unit. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. Northern hardwoods and red pine are the dominant cover types. Species preference can be managed by selective cutting. Some areas are clearcut. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is fairly well suited to building site development. It is poorly suited to septic tank absorption fields because of a poor filtering capacity and is generally unsuited to sewage lagoons because of seepage and the slope. The slope is the main limitation on building sites. It also is a limitation on sites for septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. The soil readily absorbs but does not adequately filter the effluent in septic tank absorption fields. The poor filtering capacity can result in the pollution of ground water. Land shaping and installing the distribution lines across the slope generally help to ensure that the absorption field functions properly.

The woodland ordination symbol is 3S, the land capability classification is IIIe, and the Michigan soil management group is 5a. The primary habitat type is ATD, and the secondary habitat type is TM.

15E—Rousseau fine sand, dark subsoil, 15 to 35 percent slopes. This very deep, well drained, rolling to steep soil is on ridges and knolls. Individual areas are irregularly shaped or elongated and range from 10 to more than 200 acres in size.

Typically, the surface layer is black fine sand about 2 inches thick. The subsurface layer is reddish gray fine sand about 3 inches thick. The subsoil is dark reddish brown and strong brown, very friable fine sand about 15 inches thick. The substratum to a depth of about 60 inches is light brown and brown fine sand. In places the lower part of the substratum has loamy bands.

Included with this soil in mapping are areas of the well drained Alcona soils. These soils are in landscape positions similar to those of the Rousseau soil. They are finer textured throughout than the Rousseau soil. They make up about 3 to 10 percent of the map unit.

Permeability is rapid in the Rousseau soil. The available water capacity is low. Surface runoff is slow.

This soil is used as woodland. The major management concerns are the equipment limitation, the erosion hazard, and seedling mortality. The use of equipment is limited because of the slope. Logging roads and skid trails should be constructed in the less sloping areas or on ridgetops. Constructing the roads and skid trails on the contour can minimize erosion. Loose sand can interfere with the traction of wheeled equipment, especially during dry periods. The number of suitable landing sites is severely limited by the slope. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. The slope hinders site preparation and planting. Northern hardwoods and red pine are the dominant cover types. Species preference can be managed by selective cutting. Some areas are clearcut. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is generally unsuited to building site development because of the slope. It is generally unsuited to septic tank absorption fields and sewage lagoons because of the slope and a poor filtering capacity.

The woodland ordination symbol is 3R, the land capability classification is VIe, and the Michigan soil management group is 5a. The primary habitat type is ATD, and the secondary habitat type is TM.

15F—Rousseau fine sand, dark subsoil, 35 to 60 percent slopes. This very deep, well drained, very steep soil is on ridges, knolls, and side slopes. Individual areas are irregularly shaped or elongated and range from 10 to 160 acres in size.

Typically, the surface layer is black fine sand about 2 inches thick. The subsurface layer is reddish gray fine sand about 3 inches thick. The subsoil is dark reddish brown and strong brown, very friable fine sand about 15 inches thick. The substratum to a depth of about 60 inches is light brown and brown fine sand. In places the lower part of the substratum has loamy bands.

Included with this soil in mapping are small areas of the well drained Alcona and Ocqueoc soils. These soils are in landscape positions similar to those of the Rousseau soil. They make up about 3 to 10 percent of the map unit.

Permeability is rapid in the Rousseau soil. The available water capacity is low. Surface runoff is medium.

This soil is used as woodland. The major management concerns are the equipment limitation, the erosion hazard, and seedling mortality. Access is limited by the slope. Special care is needed in laying out logging roads and in operating equipment. The roads can be designed so that they conform to the natural slope of the land. Special logging methods, such as yarding with a cable, may be needed to minimize surface disturbance. Loose sand and the slope can interfere with the traction of wheeled equipment. Erosion can result from the concentration of runoff on roads, in the tracks of wheeled equipment, and on landings. Removing water with water bars, out-sloping road surfaces, culverts, and drop structures minimizes erosion. Seedling mortality can be a problem during dry periods because of the low available water capacity, especially on south aspects. Site preparation and planting are severely limited by the slope. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting.

This soil is generally unsuited to building site development because of the slope. It is generally unsuited to septic tank absorption fields and sewage lagoons because of the slope and a poor filtering capacity.

The woodland ordination symbol is 3R, the land capability classification is VIe, and the Michigan soil management group is 5a. The primary habitat type is ATD, and the secondary habitat type is TM.

17D—Deer Park fine sand, 0 to 15 percent slopes. This very deep, excessively drained, nearly level to rolling soil is on broad plains and stabilized sand dunes. Individual areas are irregular in shape and range from 5 to several thousand acres in size.

Typically, the surface layer is very dark gray fine sand about 1 inch thick. The subsurface layer is light brownish gray fine sand about 7 inches thick. The subsoil is yellowish brown and reddish yellow, loose fine sand about 43 inches thick. The substratum to a depth of about 60 inches is light brown sand. In places the soil is mottled in the lower part of the substratum.

Included with this soil in mapping are small areas of the somewhat poorly drained Au Gres and poorly drained Kinross soils. These soils are in swales and depressions. They make up about 5 to 15 percent of the map unit.

Permeability is rapid in the Deer Park soil. The available water capacity is low. Surface runoff is slow.

This soil is used as woodland. The major management concerns are the equipment limitation, seedling mortality, and plant competition. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. Landings can be located in the nearly level areas that may be included in this unit. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. Jack pine and red pine are the dominant cover types on this soil. Clearcutting is common. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is well suited to building site development in areas where slopes are less than 8 percent. It is poorly suited to septic tank absorption fields because of a poor filtering capacity. It is generally unsuited to sewage lagoons because of seepage. The soil readily absorbs but does not adequately filter the effluent in septic tank absorption fields. The poor filtering capacity can result in the pollution of ground water. In areas where slopes are more than 8 percent, land shaping and installing the distribution lines across the slope generally help to ensure that the absorption field functions properly.

The woodland ordination symbol is 4S, the land capability classification is VIIs, and the Michigan soil management group is 5.3a. The primary habitat type is PVC, and the secondary habitat type is QAE.

17F—Deer Park fine sand, 25 to 50 percent slopes. This very deep, excessively drained, steep and very steep soil is on ridges, knolls, and side slopes. Individual areas are irregularly shaped or elongated and range from 5 to 1,200 acres in size.

Typically, the surface layer is very dark gray fine sand about 1 inch thick. The subsurface layer is light brownish gray fine sand about 7 inches thick. The subsoil is yellowish brown and reddish yellow, loose fine sand about 43 inches thick. The substratum to a depth of about 60 inches is light brown sand.

Included with this soil in mapping are small areas of the somewhat poorly drained Au Gres and poorly drained Kinross soils. These soils are in swales and depressions. They make up about 5 to 15 percent of the map unit.

Permeability is rapid in the Deer Park soil. The available water capacity is low. Surface runoff is medium.

This soil is used as woodland. The major management concerns are the equipment limitation, the erosion hazard, seedling mortality, and plant competition. Access is limited by the slope. Special care is needed in laying out logging roads and in operating equipment. The roads can be designed so that they conform to the natural slope of the land. Special logging methods, such as yarding with a cable, may be needed to minimize surface disturbance. Loose sand and the slope can interfere with the traction of wheeled equipment. Erosion can result from the concentration of runoff on roads, in the tracks of wheeled equipment, and on landings. Removing water with water bars, out-sloping road surfaces, culverts, and drop structures minimizes erosion. Landings should be located on the less sloping nearby soils. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the low available water capacity, especially on south aspects. Site preparation and planting are severely limited by the slope. Jack pine and red pine are the dominant cover types. Clearcutting is common. Before seedlings are planted, site preparation by mechanical or chemical means generally is needed to control plant competition.

This soil is generally unsuited to building site development because of the slope. It is generally unsuited to septic tank absorption fields and sewage lagoons because of the slope, seepage, and a poor filtering capacity.

The woodland ordination symbol is 4R, the land capability classification is VIIs, and the Michigan soil management group is 5.3a. The primary habitat type is PVC, and the secondary habitat type is QAE.

18B—Rubicon sand, 0 to 6 percent slopes. This very deep, excessively drained, nearly level and undulating soil is on ridges, knolls, and broad plains. Individual areas are irregularly shaped or elongated and range from 10 to several thousand acres in size.

Typically, the surface is covered by about 1 inch of partially decomposed leaf litter. The surface layer is very dark gray sand about 1 inch thick. The subsurface layer is grayish brown sand about 2 inches thick. The subsoil is brown and yellowish brown, very friable and loose sand about 17 inches thick. The substratum to a depth of about 60 inches is light brown sand. In places the soil is mottled in the lower part of the substratum. In some areas it has 5 to 15 percent gravel and cobbles on or below the surface.

Included with this soil in mapping are small areas of the well drained Ocqueoc and Pence and somewhat excessively drained Kalkaska soils. These soils are in landscape positions similar to those of the Rubicon soil. Ocqueoc soils have a stratified, sandy and loamy substratum. Pence soils have a loamy mantle underlain by sand and gravel. Also included are small areas of the somewhat poorly drained Au Gres soils in shallow depressions and along drainageways. Included soils make up about 5 to 15 percent of the map unit.

Permeability is rapid in the Rubicon soil. The available water capacity is low. Surface runoff is slow.

Most areas are used as woodland. The major management concerns are the equipment limitation and seedling mortality. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. Red pine and jack pine are the dominant cover types. Clearcutting is common. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is well suited to building site development. It is poorly suited to septic tank absorption fields because of a poor filtering capacity. It is generally unsuited to sewage lagoons because of seepage. It readily absorbs but does not adequately filter the effluent in septic tank absorption fields. The poor filtering capacity can result in the pollution of ground water.

The woodland ordination symbol is 4S, the land capability classification is VIs, and the Michigan soil management group is 5.3a. The primary habitat type is QAE, and the secondary habitat type is TMV.

18D—Rubicon sand, 6 to 15 percent slopes. This very deep, excessively drained, gently rolling and rolling soil is on ridges and knolls. Individual areas are irregularly shaped or elongated and range from 10 to 600 acres in size.

Typically, the surface is covered by about 1 inch of partially decomposed leaf litter. The surface layer is very dark gray sand about 1 inch thick. The subsurface layer is grayish brown sand about 2 inches thick. The subsoil is brown and yellowish brown, very friable sand about 17 inches thick. The substratum to a depth of about 60 inches is light brown sand. In places the soil has 5 to 15 percent gravel and cobbles on or below the surface.

Included with this soil in mapping are small areas of the well drained Ocqueoc and Pence and somewhat excessively drained Kalkaska soils. These soils are in landscape positions similar to those of the Rubicon soil. Ocqueoc soils have a stratified, sandy and loamy substratum. Pence soils have a loamy mantle underlain by sand and gravel. Kalkaska soils are darker in the upper part of the subsoil than the Rubicon soil. Also included are small areas of the somewhat poorly drained Au Gres soils in shallow depressions and along drainageways. Included soils make up about 5 to 15 percent of the map unit.

Permeability is rapid in the Rubicon soil. The available water capacity is low. Surface runoff is slow.

This soil is used as woodland. The major management concerns are the equipment limitation and seedling mortality. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. Landings can be located in the nearly level areas that may be included in this unit. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. Jack pine and red pine are the dominant cover types. Clearcutting is common. If seedlings are planted, site preparation by mechanical or chemical means generally is needed to control plant competition.

This soil is fairly well suited to building site development. It is poorly suited to septic tank absorption fields because of a poor filtering capacity. It is generally unsuited to sewage lagoons because of seepage and the slope. The slope is the main limitation on building sites. It also is a limitation on sites for septic tank absorption fields. Buildings should be designed so that they conform to the natural slope of the land. The soil readily absorbs but does not adequately filter the effluent in septic tank absorption fields. The poor filtering capacity can result in the pollution of ground water. Land shaping and installing the distribution lines across the slope generally help to ensure that the absorption field functions properly.

The woodland ordination symbol is 4S, the land capability classification is VIs, and the Michigan soil management group is 5.3a. The primary habitat type is QAE, and the secondary habitat type is TMV.

18E—Rubicon sand, 15 to 35 percent slopes. This very deep, excessively drained, rolling to steep soil is on ridges and knolls. Individual areas are irregularly shaped or elongated and range from 10 to 50 acres in size.

Typically, the surface is covered by about 1 inch of partially decomposed leaf litter. The surface layer is very dark gray sand about 1 inch thick. The subsurface layer is grayish brown sand about 2 inches thick. The subsoil is brown and yellowish brown, very friable sand about 17 inches thick. The substratum to a depth of about 60 inches is light brown sand. In places the soil has 5 to 15 percent gravel and cobbles on or below the surface.

Included with this soil in mapping are small areas of the well drained Ocqueoc and Pence and somewhat excessively drained Kalkaska soils. These soils are in landscape positions similar to those of the Rubicon soil. Ocqueoc soils have a stratified, sandy and loamy substratum. Pence soils have a loamy mantle underlain by sand and gravel. Kalkaska soils are darker in the upper part of the subsoil than the Rubicon soil. Also included are small areas of the somewhat poorly drained Au Gres soils in shallow depressions and along drainageways. Included soils make up about 5 to 15 percent of the map unit.

Permeability is rapid in the Rubicon soil. The available water capacity is low. Surface runoff is slow.

This soil is used as woodland. The major management concerns are the equipment limitation, the erosion hazard, and seedling mortality. The use of equipment is limited because of the slope. Logging roads and skid trails should be constructed in the less sloping areas or on ridgetops. Constructing the roads and skid trails on the contour can minimize erosion. Loose sand can interfere with the traction of wheeled equipment, especially during dry periods. The number of suitable landing sites is severely limited by the slope. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. The slope hinders site preparation and planting. Red pine and jack pine are the dominant cover types. Clearcutting is common. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is generally unsuited to building site development because of the slope. It is generally unsuited to septic tank absorption fields and sewage lagoons because of the slope and a poor filtering capacity.

The woodland ordination symbol is 4R, the land capability classification is VIIs, and the Michigan soil management group is 5.3a. The primary habitat type is QAE, and the secondary habitat type is TMV.

19B—Kalkaska sand, 0 to 6 percent slopes. This very deep, somewhat excessively drained, nearly level and undulating soil is on ridges, knolls, and broad plains. Individual areas are irregularly shaped or elongated and range from 10 to several thousand acres in size.

Typically, the surface is covered by about 1 inch of partially decomposed leaf litter. The surface layer is dark reddish brown sand about 2 inches thick. The subsurface layer is reddish brown sand about 5 inches thick. The subsoil is about 24 inches thick. The upper part is dark reddish brown, friable loamy sand, and the lower part is dark brown and strong brown, loose and very friable sand. The substratum to a depth of about 60 inches is yellowish brown sand. In some places the soil has 5 to 15 percent gravel and cobbles on or below the surface. In other places it is mottled in the lower part of the substratum. In some areas the surface layer is loamy sand.

Included with this soil in mapping are small areas of the well drained Pence and moderately well drained Manistee and Alcona soils. These soils are in landscape positions similar to those of the Kalkaska soil. Pence soils have a loamy mantle underlain by sand and gravel. Manistee soils have a clayey substratum. Alcona soils are finer textured throughout than the Kalkaska soil. Also included are small areas of the somewhat poorly drained Au Gres soils in depressions. Included soils make up about 5 to 15 percent of the map unit.

Permeability is rapid in the Kalkaska soil. The available water capacity is low. Surface runoff is slow.

Most areas are used as woodland. The major management concerns are the equipment limitation and seedling mortality. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the low available water capacity. Planting containerized seedlings or special planting stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting. Some areas are clearcut. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is poorly suited to cropland, but such crops as oats, wheat, and a mixture of grasses and legumes can be grown. The major management needs are measures that conserve moisture during dry periods, help to control soil blowing, and maintain the organic matter content. Examples are buffer strips, vegetative barriers, field windbreaks, and a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface.

This soil is fairly well suited to pasture. Overgrazing during dry periods can destroy the plant cover. Proper stocking rates, rotation grazing, strip grazing, and restricted use during dry periods help to keep the pasture in good condition.

This soil is well suited to building site development. It is poorly suited to septic tank absorption fields because of a poor filtering capacity. It is generally unsuited to sewage lagoons because of seepage. It readily absorbs but does not adequately filter the effluent in septic tank absorption fields. The poor filtering capacity can result in the pollution of ground water.

The woodland ordination symbol is 3S, the land capability classification is IVs, and the Michigan soil management group is 5a. The primary habitat type is ATD, and the secondary habitat type is TM.

19D—Kalkaska sand, 6 to 15 percent slopes. This very deep, somewhat excessively drained, gently rolling and rolling soil is on the sides of ridges and knolls. Individual areas are irregularly shaped or elongated and range from 10 to 700 acres in size.

Typically, the surface is covered by about 1 inch of partially decomposed leaf litter. The surface layer is dark reddish brown sand about 2 inches thick. The subsurface layer is reddish brown sand about 5 inches thick. The subsoil is about 24 inches thick. The upper part is dark reddish brown, friable loamy sand, and the lower part is dark brown and strong brown, very friable and loose sand. The substratum to a depth of about 60 inches is yellowish brown sand. In some places the soil has 5 to 15 percent gravel and cobbles on or below the surface. In other places the surface layer is sand.

Included with this soil in mapping are small areas of the moderately well drained Alcona and well drained Pence, Ocqueoc, and Manistee soils. These soils are in landscape positions similar to those of the Kalkaska soil. Alcona soils are finer textured throughout than the Kalkaska soil. Pence soils have a loamy mantle underlain by sand and gravel. Ocqueoc soils have a stratified, sandy and loamy substratum. Manistee soils have a clayey substratum. Included soils make up about 5 to 15 percent of the map unit.

Permeability is rapid in the Kalkaska soil. The available water capacity is low. Surface runoff is slow.

This soil is used as woodland. The major management concerns are the equipment limitation and seedling mortality. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. Landings can be located in the small nearly level areas that may be included in this unit. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting. Some areas are clearcut. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is fairly well suited to building site development. The slope is the main limitation on building sites. The soil is poorly suited to septic tank absorption fields because of a poor filtering capacity and the slope. It is generally unsuited to sewage lagoons because of seepage and the slope. Buildings should be designed so that they conform to the natural slope of the land. The soil readily absorbs but does not adequately filter the effluent in septic tank absorption fields. The poor filtering capacity can result in the pollution of ground water. Land shaping and installing the distribution lines across the slope generally help to ensure that the absorption field functions properly.

The woodland ordination symbol is 3S, the land capability classification is VIs, and the Michigan soil management group is 5a. The primary habitat type is ATD, and the secondary habitat type is TM.

19E—Kalkaska sand, 15 to 35 percent slopes. This very deep, somewhat excessively drained, rolling to steep soil is on ridges and knolls. Individual areas are elongated or irregular in shape and range from 15 to 300 acres in size.

Typically, the surface is covered by about 1 inch of partially decomposed leaf litter. The surface layer is dark reddish brown sand about 2 inches thick. The subsurface layer is reddish brown sand about 5 inches thick. The subsoil is about 24 inches thick. The upper part is dark reddish brown, friable loamy sand, and the lower part is dark brown and strong brown, very friable and loose sand. The substratum to a depth of about 60 inches is yellowish brown sand. In some places the soil has 5 to 15 percent gravel and cobbles on or below the surface. In other places the surface layer is loamy sand.

Included with this soil in mapping are small areas of the well drained Alcona, Pence, Ocqueoc, and Manistee soils. These soils are in landscape positions similar to those of the Kalkaska soil. Alcona soils are finer textured throughout than the Kalkaska soil. Pence soils have a loamy mantle underlain by sand and gravel. Ocqueoc soils have a stratified, sandy and loamy substratum. Manistee soils have a clayey substratum. Included soils make up about 5 to 15 percent of the map unit.

Permeability is rapid in the Kalkaska soil. The available water capacity is low. Surface runoff is slow or medium.

This soil is used as woodland. The major management concerns are the equipment limitation, the erosion hazard, and seedling mortality. The use of equipment is limited because of the slope. Logging roads and skid trails should be constructed in the less sloping areas or on ridgetops. Constructing the roads and skid trails on the contour can minimize erosion. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. The number of suitable landing sites is severely limited by the slope. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. The slope hinders site preparation and planting. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is generally unsuited to building site development because of the slope. It is generally unsuited to septic tank absorption fields and sewage lagoons because of the slope and a poor filtering capacity.

The woodland ordination symbol is 3R, the land capability classification is VIIs, and the Michigan soil management group is 5a. The primary habitat type is ATD, and the secondary habitat type is TM.

19F—Kalkaska sand, 35 to 60 percent slopes. This very deep, somewhat excessively drained, steep and very steep soil is on ridges and knolls. Individual areas are elongated or irregularly shaped and range from 20 to 500 acres in size.

Typically, the surface is covered by about 1 inch of partially decomposed leaf litter. The surface layer is dark reddish brown sand about 2 inches thick. The subsurface layer is reddish brown sand about 5 inches thick. The subsoil is about 24 inches thick. The upper part is dark reddish brown, friable loamy sand, and the lower part is dark brown and strong brown, very friable and loose sand. The substratum to a depth of about 60 inches is yellowish brown sand. In some places the soil has 5 to 15 percent gravel and cobbles on or below the surface. In other places the surface layer is loamy sand.

Included with this soil in mapping are small areas of the well drained Alcona, Ocqueoc, and Manistee soils. These soils are in landscape positions similar to those of the Kalkaska soil. Alcona soils are finer textured throughout than the Kalkaska soil. Ocqueoc soils have a stratified, sandy and loamy substratum. Manistee soils have a clayey substratum. Included soils make up about 5 to 15 percent of the map unit.

Permeability is rapid in the Kalkaska soil. The available water capacity is low. Surface runoff is medium.

This soil is used as woodland. The major management concerns are the equipment limitation, the erosion hazard, and seedling mortality. Access is limited by the slope. Special care is needed in laying out logging roads and in operating equipment. The roads can be designed so that they conform to the natural slope of the land. Special logging methods, such as yarding with a cable, may be needed to minimize surface disturbance. Loose sand and the slope can interfere with the traction of wheeled equipment. Erosion can result from the concentration of runoff on roads, in the tracks of wheeled equipment, and on landings. Removing water with water bars, out-sloping road surfaces, culverts, and drop structures minimizes erosion. Seedling mortality can be a problem during dry periods because of the low available water capacity, especially on south aspects. Site preparation and planting are severely limited by the slope. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting.

This soil is generally unsuited to building site development because of the slope. It is generally unsuited to septic tank absorption fields and sewage lagoons because of the slope and a poor filtering capacity.

The woodland ordination symbol is 3R, the land capability classification is VIIs, and the Michigan soil management group is 5a. The primary habitat type is ATD, and the secondary habitat type is TM.

20A—Croswell sand, 0 to 3 percent slopes. This very deep, moderately well drained, nearly level soil is on broad plains and low ridges. Individual areas are irregularly shaped or elongated and range from 5 to 1,400 acres in size.

Typically, the surface is covered by about 2 inches of black, partially decomposed leaf litter. The surface layer is brown sand about 2 inches thick. The subsoil is strong brown and yellowish brown, very friable and friable sand about 27 inches thick. The substratum to a depth of about 60 inches is light yellowish brown and brownish yellow, mottled sand. In places the upper part of the subsoil is darker.

Included with this soil in mapping are small areas of the somewhat poorly drained Allendale and Au Gres soils in the slightly lower landscape positions. Allendale soils have a clayey substratum. Also included are small areas of the very poorly drained Markey soils in depressions and small areas of the excessively drained Rubicon soils in the slightly higher landscape positions. Markey soils have layers of muck 16 to 51 inches thick and are underlain by sand. Included soils make up about 5 to 15 percent of the map unit.

Permeability is rapid in the Croswell soil. The available water capacity is low. Surface runoff is slow. The seasonal high water table is at a depth of 2 to 4 feet from late fall to late spring.

Most areas are used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. Because of the wetness, trees on this soil are shallow rooted. Some may be blown down during periods of high winds. Red pine and jack pine are the dominant cover types. Clearcutting is common. If seedlings are planted, site preparation by mechanical or chemical means generally is needed to control plant competition.

This soil is poorly suited to cropland, but such crops as oats, wheat, and a mixture of grasses and legumes can be grown. The major management needs are measures that conserve moisture during dry periods, help to control soil blowing, and maintain the organic matter content. Examples are buffer strips, vegetative barriers, field windbreaks, and a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface.

This soil is fairly well suited to pasture. Overgrazing during dry periods can destroy the plant cover. Proper stocking rates, rotation grazing, strip grazing, and restricted use during dry periods help to keep the pasture in good condition.

This soil is fairly well suited to buildings without basements but is poorly suited to buildings with basements. Buildings with basements can be constructed on well compacted fill material, which raises the level of the site. A drainage system helps to lower the water table. The soil is poorly suited to septic tank absorption fields because of the high water table and a poor filtering capacity. It readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. If a septic tank disposal system is installed, filling or mounding with suitable material can raise the site above the seasonal high water table. The soil is generally unsuited to sewage lagoons because of seepage and wetness.

The woodland ordination symbol is 5S, the land capability classification is IVs, and the Michigan soil management group is 5a. The primary habitat type is TM.

21A—Au Gres sand, 0 to 3 percent slopes. This very deep, somewhat poorly drained, nearly level soil is in depressions and swales and on low, broad plains. Individual areas are irregular in shape and range from 3 to more than 300 acres in size.

Typically, the surface is covered by about 1 inch of well decomposed leaf litter. The surface layer is black sand about 1 inch thick. The subsurface layer is pinkish gray sand about 4 inches thick. The subsoil is mottled sand about 19 inches thick. The upper part is yellowish red and very friable, and the lower part is strong brown and loose. The substratum to a depth of about 60 inches is brownish yellow and light yellowish brown, mottled sand.

Included with this soil in mapping are small areas of the somewhat excessively drained Kalkaska and excessively drained Rubicon soils on ridges and knobs.

Also included are small areas of the poorly drained Kinross soils in depressions and drainageways. Included soils make up about 5 to 15 percent of the map unit.

Permeability is rapid in the Au Gres soil. The available water capacity is low. Surface runoff is slow. The seasonal high water table is at a depth of 0.5 foot to 1.5 feet from late fall to late spring.

Most areas are used as woodland. The major management concerns are the equipment limitation, the windthrow hazard, seedling mortality, and plant competition. Equipment should be used only during dry summer months or during winter months when the snow cover is adequate. Landings can be used only when the soil is dry or frozen. Because of the high water table, trees on this soil are shallow rooted. Some may be blown down during periods of high winds. Seedling losses may be high during wet spring months and dry summer months. Selection of special planting stock, such as containerized seedlings, and special site preparation that protects the surface with thin layers of loose slash can reduce the seedling mortality rate. The aspen cover type is dominant on this soil. Clearcutting is common. After the trees are cut, plant competition can delay natural regeneration. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is poorly suited to cropland, but such crops as oats, wheat, and a mixture of grasses and legumes can be grown. The major management needs are measures that remove excess water during wet periods, conserve moisture during dry periods, help to control soil blowing, and maintain the organic matter content. Cover crops, buffer strips, field windbreaks, and a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface help to control soil blowing. A combination of surface and subsurface drains can lower the seasonal high water table.

This soil is fairly well suited to pasture and hay. The forage species that are tolerant of wetness, such as trefoil-grass mixtures, should be selected for planting. Overgrazing can destroy forage plants. Proper stocking rates and restricted grazing during wet periods help to keep the pasture in good condition.

This soil is generally unsuited to building site development because of the wetness. It is generally unsuited to septic tank absorption fields because of the wetness and a poor filtering capacity and to sewage lagoons because of seepage and the wetness.

The woodland ordination symbol is 6W, the land capability classification is IVw, and the Michigan soil management group is 5b. The primary habitat type is TMC.

22—Kinross muck. This very deep, poorly drained, nearly level soil is on low plains and in swales and depressions. It is frequently ponded. Individual areas are irregular in shape and range from 5 to 200 acres in size.

Typically, the surface layer is black muck about 5 inches thick. The subsurface layer is brown sand about 5 inches thick. The subsoil is dark brown and brown, mottled, very friable and loose sand about 32 inches thick. The substratum to a depth of about 60 inches is grayish brown sand.

Included with this soil in mapping are small areas of the somewhat poorly drained Au Gres and Wainola soils on low knolls and ridges. Also included are small areas of the very poorly drained Dawson and Markey soils. These soils are in landscape positions similar to or slightly lower than those of the Kinross soil. They formed in organic material 16 to 50 inches deep over sand. Included soils make up about 5 to 15 percent of the map unit.

Permeability is rapid in the Kinross soil. The available water capacity is low. Surface runoff is very slow or ponded. The seasonal high water table is 1 foot above to 1 foot below the surface from fall to early summer.

This soil is used as woodland. Some areas support wetland grasses. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Equipment should be used only during dry summer months or during winter months when the snow cover is adequate. Year-round logging roads require fill and a gravel base. Culverts are needed to maintain the natural drainage system. The number of suitable landing sites is severely limited because of the wetness. Because of the high water table, trees on this soil are shallow rooted. Many may be blown down during periods of high winds. The swamp conifer cover type is dominant on this soil. Clearcutting is common. After the trees are cut, competition from wetland brush can delay or prevent natural regeneration. The opportunities for planting are limited on this soil because of the wetness, severe seedling mortality, and plant competition.

This soil is generally unsuited to building site development because of the ponding. It is generally unsuited to septic tank absorption fields because of the ponding and a poor filtering capacity and to sewage lagoons because of seepage, excess humus, and the ponding.

The woodland ordination symbol is 2W, the land capability classification is VIw, and the Michigan soil management group is 5c. The primary habitat type is TTS, and the secondary habitat type is TMC.

23—Roscommon muck. This very deep, poorly drained, nearly level soil is along drainageways, in depressions and swales, and on low plains. It is frequently ponded. Individual areas are irregular in shape and range from 5 to 200 acres in size.

Typically, the upper part of the surface layer is about 1 inch of partially decomposed leaf litter. The lower part is black muck about 8 inches thick. The substratum to a depth of about 60 inches is grayish brown and yellowish brown, mottled sand.

Included with this soil in mapping are small areas of the somewhat poorly drained Au Gres soils on low ridges and knolls. Also included are areas of the very poorly drained Markey soils in landscape positions similar to or slightly lower than those of the Roscommon soil. Markey soils formed in organic material 16 to 50 inches deep over sand. Included soils make up about 5 to 15 percent of the map unit.

Permeability is rapid in the Roscommon soil. The available water capacity is low. Surface runoff is very slow or ponded. The seasonal high water table is 1 foot above to 1 foot below the surface from fall to early summer.

This soil is used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the wetness and the instability of the organic surface layer, trees can be logged only during periods in winter when logging roads are frozen. Year-round logging roads require fill and a gravel base. Culverts are needed to maintain the natural drainage system. The number of suitable landing sites is severely limited because of the wetness. The swamp conifer cover type is dominant on this soil. Clearcutting is common. After the trees are cut, competition from wetland brush can delay or prevent natural regeneration. Because of the high water table, the trees are shallow rooted. Many may be blown down during periods of high winds. Trees generally are not planted on this soil because of severe seedling mortality, the wetness, and severe plant competition.

This soil is generally unsuited to building site development because of the ponding. It is generally unsuited to septic tank absorption fields because of the ponding and a poor filtering capacity and to sewage lagoons because of seepage, excess humus, and the ponding.

The woodland ordination symbol is 6W, the land capability classification is Vlw, and the Michigan soil management group is 5c. No habitat type is assigned.

25B—Guardlake loam, 0 to 6 percent slopes. This very deep, well drained, nearly level and undulating soil is on upland flats. Individual areas are irregular in shape and range from 5 to 600 acres in size.

Typically, the surface layer is black loam about 5 inches thick. The subsoil is about 11 inches of dark reddish brown and reddish brown, friable gravelly sandy loam and very gravelly sandy loam. The substratum to a depth of about 60 inches is brown and pale brown very gravelly sand and very gravelly coarse sand. In some places the subsoil is loamy sand. In other places the surface layer is sandy loam, fine sandy loam, or the gravelly or cobbly analogs of those textures.

Included with this soil in mapping are areas of the somewhat excessively drained Kalkaska soils in landscape positions similar to those of the Guardlake soil. These soils make up about 5 to 15 percent of the map unit.

Permeability is moderate in the upper part of the Guardlake soil and very rapid in the lower part. The available water capacity is low. Surface runoff is slow.

Most areas are used as woodland. There are no major management concerns. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is fairly well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management concern is conserving moisture. A system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface can conserve moisture.

This soil is well suited to pasture and hay. Overgrazing during dry periods can destroy the plant cover. Proper stocking rates, rotation grazing, strip grazing, and restricted use during dry periods help to keep the pasture in good condition.

This soil is fairly well suited to building site development. The content of coarse fragments is a limitation on sites for buildings. The coarse fragments should be removed. The soil is poorly suited to septic tank absorption fields because of a poor filtering capacity. It readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. The soil is generally unsuited to sewage lagoons because of seepage.

The woodland ordination symbol is 3A, the land capability classification is IIIs, and the Michigan soil management group is Ga. The primary habitat type is AVO.

25D—Guardlake loam, 6 to 15 percent slopes. This very deep, well drained, gently rolling and rolling soil is on ridges and knolls. Individual areas are irregularly shaped or elongated and range from 10 to 100 acres in size.

Typically, the surface layer is black loam about 5 inches thick. The subsoil is about 11 inches of dark reddish brown and reddish brown, friable gravelly sandy loam and very gravelly sandy loam. The substratum to a depth of about 60 inches is brown and pale brown very gravelly sand and very gravelly coarse sand. In some places the subsoil is loamy sand. In other places the surface layer is sandy loam, fine sandy loam, or the gravelly or cobbly analogs of those textures.

Included with this soil in mapping are small areas of the somewhat excessively drained Kalkaska soils in landscape positions similar to those of the Guardlake soil. These soils formed in deep deposits of sandy material. They make up about 5 to 15 percent of the map unit.

Permeability is moderate in the upper part of the Guardlake soil and very rapid in the lower part. The available water capacity is low. Surface runoff is slow.

Most areas are used as woodland. The major management concern is the equipment limitation on landing sites. Landings can be located in the small nearly level areas that may be included in this unit. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is fairly well suited to building site development. The slope and the content of coarse fragments are the main limitations on building sites. The soil is poorly suited to septic tank absorption fields because of the slope and a poor filtering capacity. It is generally unsuited to sewage lagoons because of seepage and the slope. Buildings should be designed so that they conform to the natural slope of the land. The coarse fragments should be removed from building sites. The soil readily absorbs but does not adequately filter the effluent in septic tank absorption fields. The poor filtering capacity can result in the pollution of ground water. Land shaping and installing the distribution lines across the slope generally help to ensure that the absorption field functions properly.

The woodland ordination symbol is 3A, the land capability classification is IIIs, and the Michigan soil management group is Ga. The primary habitat type is AVO.

27B—Emmet sandy loam, 1 to 6 percent slopes. This very deep, well drained, nearly level and undulating soil is on knolls and broad plains. Individual areas are irregular in shape and range from 10 to more than 800 acres in size.

Typically, the surface layer is black sandy loam about 6 inches thick. The subsoil is brown and reddish brown, friable sandy loam about 23 inches thick. The substratum to a depth of about 60 inches is reddish brown sandy loam that has thin lenses of brown loamy sand. In places the surface layer is fine sandy loam.

Included with this soil in mapping are small areas of the well drained Longrie and Menominee soils. These soils are in landscape positions similar to those of the Emmet soil. Longrie soils have limestone bedrock at a depth of 20 to 40 inches. Menominee soils are sandy textured in the upper part. Included soils make up about 5 to 15 percent of the map unit.

Permeability and the available water capacity are moderate in the Emmet soil. Surface runoff is slow.

Most areas are used as pasture or cropland. Some areas are wooded.

The major concerns in managing woodland are the equipment limitation and plant competition. Trafficability may be briefly limited in spring and in other excessively wet periods. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is well suited to such crops as oats, wheat, barley, and a mixture of grasses and legumes. The major management needs are measures that control water erosion, maintain tilth, and help to control soil blowing. Examples are buffer strips, vegetative barriers, field windbreaks, crop residue management, and a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface.

This soil is well suited to pasture and hay. Overgrazing or grazing when the soil is too wet can cause surface compaction, destroy forage plants, and increase the susceptibility to erosion. Proper stocking rates, rotation grazing, strip grazing, and restricted use during wet periods can help to keep the pasture in good condition and control excessive erosion.

This soil is well suited to building site development. It is only fairly well suited to septic tank absorption fields because of the moderately slow permeability. Special construction methods, such as enlarging the absorption fields or installing alternating drain fields, can help to overcome this limitation. The soil is generally unsuited to sewage lagoons because of seepage.

The woodland ordination symbol is 3L, the land capability classification is IIe, and the Michigan soil management group is 3a. The primary habitat type is AVO-A.

28B—Longrie sandy loam, 1 to 6 percent slopes. This moderately deep, well drained, nearly level and undulating soil is on ridges, benches, and broad plains. Individual areas are irregular in shape and range from 5 to 50 acres in size.

Typically, the surface layer is black sandy loam about 4 inches thick. The subsurface layer is reddish gray sandy loam about 5 inches thick. The subsoil is dark reddish brown and reddish brown, friable fine sandy loam about 18 inches thick. The substratum is light brown gravelly loam about 4 inches thick. Limestone bedrock is at a depth of about 31 inches. In some places the depth to bedrock is more than 40 inches or less than 20 inches. In other places the surface layer is fine sandy loam, silt loam, or loam.

Included with this soil in mapping are small areas of the somewhat excessively drained Duel and somewhat poorly drained Ensign soils. Duel soils formed in sandy deposits over limestone bedrock. They are in landscape positions similar to those of the Longrie soil. Ensign soils are in depressions. Included soils make up about 5 to 15 percent of the map unit.

Permeability is moderate in the Longrie soil. The available water capacity is low. Surface runoff is slow.

Most areas are used as woodland. The major management concerns are the equipment limitation, the windthrow hazard, and plant competition. The bedrock interferes with road construction in some areas. Trafficability is briefly limited in spring and in other excessively wet periods. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. Because of the bedrock, trees on this soil are shallow rooted. Some may be blown down during periods of high winds. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is fairly well suited to such crops as oats, wheat, barley, and a mixture of grasses and legumes. The major management needs are measures that help to control soil blowing and water erosion. Examples are cover crops, buffer strips, vegetative barriers, field windbreaks, grassed waterways, and a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface.

This soil is fairly well suited to pasture. Maintaining an adequate vegetative cover by preventing overgrazing helps to control surface runoff and erosion.

This soil is fairly well suited to buildings without basements but is poorly suited to buildings with basements. The depth to bedrock is the major limitation. Because of the depth to bedrock and seepage, the soil is poorly suited to septic tank absorption fields and is generally unsuited to sewage lagoons. Buildings with basements can be constructed on well compacted fill material, which raises the level of the site. If a septic tank disposal system is installed, mounding the absorption field with suitable material can raise the site above the bedrock and reduce the hazard of seepage.

The woodland ordination symbol is 2D, the land capability classification is IIe, and the Michigan soil management group is 3/Ra. The primary habitat type is AVO.

29A—Solona fine sandy loam, 0 to 3 percent slopes. This very deep, somewhat poorly drained, nearly level soil is on low knolls and flats. Individual areas are irregular in shape and range from 3 to 400 acres in size.

Typically, the surface layer is black fine sandy loam about 3 inches thick. The subsoil is friable fine sandy loam about 22 inches thick. The upper part is dark brown, and the lower part is dark yellowish brown and brown and is mottled. The substratum to a depth of about 60 inches is yellowish brown, mottled gravelly fine sandy loam.

Included with this soil in mapping are small areas of the well drained Posen soils on ridges and knolls. These soils make up about 5 to 10 percent of the map unit.

Permeability and the available water capacity are moderate in the Solona soil. Surface runoff is slow. The seasonal high water table is at a depth of 1 to 3 feet from late fall to late spring. The potential for frost action is high.

Most areas are used as woodland. The major management concerns are the equipment limitation, the windthrow hazard, and plant competition. Equipment should be used only during dry summer months or during winter months when the snow cover is adequate. Year-round logging roads require a gravel base. Culverts are needed to maintain the natural drainage system. Landings can be used only when the soil is dry or frozen. Because of the high water table, trees on this soil are shallow rooted. Some may be blown down during periods of high winds. Lowland hardwoods and aspen are the dominant cover types. After the trees are cut, plant competition can delay natural regeneration. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management needs are measures that remove excess water during wet periods and that maintain good tilth. A subsurface drainage system can help to lower the water table. Additions of organic material and a system of conservation tillage that does not invert the soil and that leaves crop residue on the surface help to maintain good tilth.

This soil is well suited to pasture. The forage species that can tolerate wetness, such as trefoil-grass mixtures, should be selected for planting. Proper stocking rates, rotation grazing, and restricted grazing during wet periods help to keep the pasture in good condition.

This soil is poorly suited to building site development because of the wetness. It is generally unsuited to septic tank absorption fields because of the wetness and to sewage lagoons because of the wetness and seepage.

The woodland ordination symbol is 3W, the land capability classification is IIw, and the Michigan soil management group is 3b. No habitat type is assigned.

32A—Allendale loamy fine sand, 0 to 3 percent slopes. This very deep, somewhat poorly drained, nearly level soil is on broad plains, low knolls, and upland flats along streams. Individual areas are irregularly shaped or elongated and range from 3 to 500 acres in size.

Typically, the surface layer is black loamy fine sand about 5 inches thick. The subsurface layer is pinkish gray fine sand about 3 inches thick. The subsoil is about 27 inches thick. The upper part is dark reddish brown, very friable loamy fine sand; the next part is strong brown and yellowish brown, mottled, very friable fine sand; and the lower part is reddish brown, mottled, firm silty clay. The substratum to a depth of about 60 inches is light reddish brown, mottled silty clay that has thin strata of yellowish brown silt loam and silty clay loam. In places the surface layer is fine sand or loamy sand.

Included with this soil in mapping are small areas of the poorly drained Soo and Fibre soils in depressions and drainageways. Also included are the somewhat poorly drained Rudyard soils in landscape positions similar to those of the Allendale soil. Soo soils formed in stratified, loamy and clayey material. Rudyard soils formed in deep deposits of clayey material. Included soils make up about 5 to 15 percent of the map unit.

Permeability is moderately rapid and rapid in the sandy upper part of the Allendale soil and very slow in the clayey lower part. The available water capacity is moderate. Surface runoff is slow. A perched seasonal high water table is at a depth of 1 to 2 feet from late fall to late spring.

Most areas are used as woodland. Some areas are used as cropland or pasture.

The major concerns in managing woodland are the equipment limitation, the windthrow hazard, and plant competition. Because of the high water table, the use of equipment is restricted to dry summer months or to winter months when the snow cover is adequate. Year-round logging roads should be graveled. Culverts are needed to maintain the natural drainage system. Landings can be used only when the soil is dry or frozen. Because of the high water table, trees on this soil are shallow rooted. Some may be blown down during periods of high winds. The aspen cover type is dominant on this soil. Clearcutting is common. After the trees are cut, plant competition can delay natural regeneration. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is fairly well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management needs are measures that remove excess water during wet periods, maintain the organic matter content, and help to control soil blowing. A subsurface drainage system can help to lower the water table. Additions of organic matter and a system of conservation tillage that does not invert the soil and that leaves crop residue on the surface help to control soil blowing and maintain the organic matter content.

This soil is well suited to pasture. The forage species that can tolerate wetness, such as trefoil-grass mixtures, should be used. Proper stocking rates, rotation grazing, and restricted grazing during wet periods help to keep the pasture in good condition.

This soil is poorly suited to building site development because of the wetness. It is generally unsuited to septic tank absorption fields because of the wetness, a poor filtering capacity in the sandy upper part of the profile, and the very slow permeability in the clayey lower part. The soil is generally unsuited to sewage lagoons because of the wetness and seepage.

The woodland ordination symbol is 4W, the land capability classification is IIIw, and the Michigan soil management group is 4/1b. The primary habitat type is TMC-D, and the secondary habitat type is TMC.

33—Pits, sand and gravel. These areas are open excavations from which sand and gravel have been removed. Some have been excavated to a depth below the water table. The outer edges of the excavations have steep vertical side slopes. The exposed material supports little or no vegetation. Individual areas range from 3 to 100 acres in size.

Onsite investigation is needed to determine specific soil properties.

No interpretive groups are assigned.

34—Entisols, flooded. These deep, nearly level, poorly drained and very poorly drained soils formed in alluvial deposits. They are on flood plains along rivers and streams and are frequently flooded. The water table is at or above the surface during most of the year, except for unusually dry periods. Individual areas of this unit are elongated or irregular in shape and range from 40 to 800 acres in size.

The texture of these stratified, alluvial soils generally ranges from sand to clay. In places the surface layer is muck.

Included with these soils in mapping are small areas of the poorly drained Kinross and Pickford soils. These included soils are in landscape positions similar to or slightly higher than those of the Entisols. Also included are small areas of the well drained Ontonagon soils on side slopes. Kinross soils are sandy throughout. Ontonagon and Pickford soils are clayey throughout. Included soils make up about 5 to 15 percent of the map unit.

Most areas are marsh land and beaver floodings, but a few areas are wooded. These soils are well suited to wetland wildlife habitat. They are generally unsuited to most other uses. Onsite investigation is essential for proper evaluation of the potential for specific uses.

No interpretive groups are assigned.

35—Histosols and Aquents, ponded. This map unit consists of deep, nearly level, very poorly drained, organic soils and very poorly drained, sandy or loamy soils. These soils are in drainageways and depressions and along lakeshores. The water table is at or above the surface during most or all of the year, except for unusually dry periods. Individual areas of this unit are elongated or irregularly shaped and range from 3 to 800 acres in size. Some are made up entirely of either Histosols or Aquents, and others are made up of both soils. The two soils are used and managed so similarly that separating them in mapping is not practical.

Included with these soils in mapping are small areas of open water and small areas of the somewhat poorly drained Au Gres and Wainola soils on low ridges and low knolls. Also included are small areas of the excessively drained Rubicon and well drained Rousseau soils on knolls and ridges. The included soils formed in sandy deposits. They make up about 5 to 15 percent of the map unit.

Most areas of the Histosols and Aquents are marsh land, but a few areas include wooded beaver floodings. These soils are well suited to wetland wildlife habitat (fig. 6). They are generally unsuited to most other uses.

No interpretive groups are assigned.

36—Markey and Carbondale mucks. These very deep, nearly level, very poorly drained, organic soils are in broad depressions, swamps, and drainageways. They are frequently ponded. Individual areas are oval or elongated and range from 5 to several thousand acres in size. Some are made up of only one of these soils, and others are made up of both soils. The two soils are used and managed so similarly that separating them in mapping is not practical.

Typically, the Markey soil has a surface layer of dark reddish brown mucky peat about 3 inches thick. Below this is black, dark brown, and dark reddish brown muck about 30 inches thick. The substratum to a depth of about 60 inches is brown sand. In some places the soil has less than 16 inches of organic material. In other places the substratum is very fine sand or silt. In some areas the surface layer is mucky peat.

Typically, the Carbondale soil has a surface layer of black muck about 14 inches thick. The underlying layers to a depth of about 60 inches are dark reddish brown muck and dark reddish brown and very dark grayish brown mucky peat.

Included with these soils in mapping are small areas of the somewhat poorly drained Au Gres and Wainola soils on low ridges and knolls. Also included are the poorly drained Kinross soils in landscape positions similar to or slightly higher than those of the Markey and Carbondale soils. Included soils make up about 5 to 15 percent of the map unit.

Permeability is moderately slow to moderately rapid in the organic layers of the Markey soil and rapid in the sandy substratum. It is moderately slow to moderately rapid in the Carbondale soil. The available water capacity is high in both soils. The water table is 1 foot above to 1 foot below the surface from fall to summer and seldom drops below a depth of 1 foot. Surface runoff is very slow or ponded. The potential for frost action is high.

These soils are used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the wetness and the instability of the muck, trees can be logged only during periods in winter when logging roads are frozen. Because of the wetness, the trees are shallow rooted. Many may be blown down during periods of high winds. The swamp conifer cover type is dominant on these soils. Clearcutting and strip cutting are common. After the trees are cut, competition from wetland brush can delay or prevent natural regeneration. Trees generally are not planted on these soils because of severe seedling

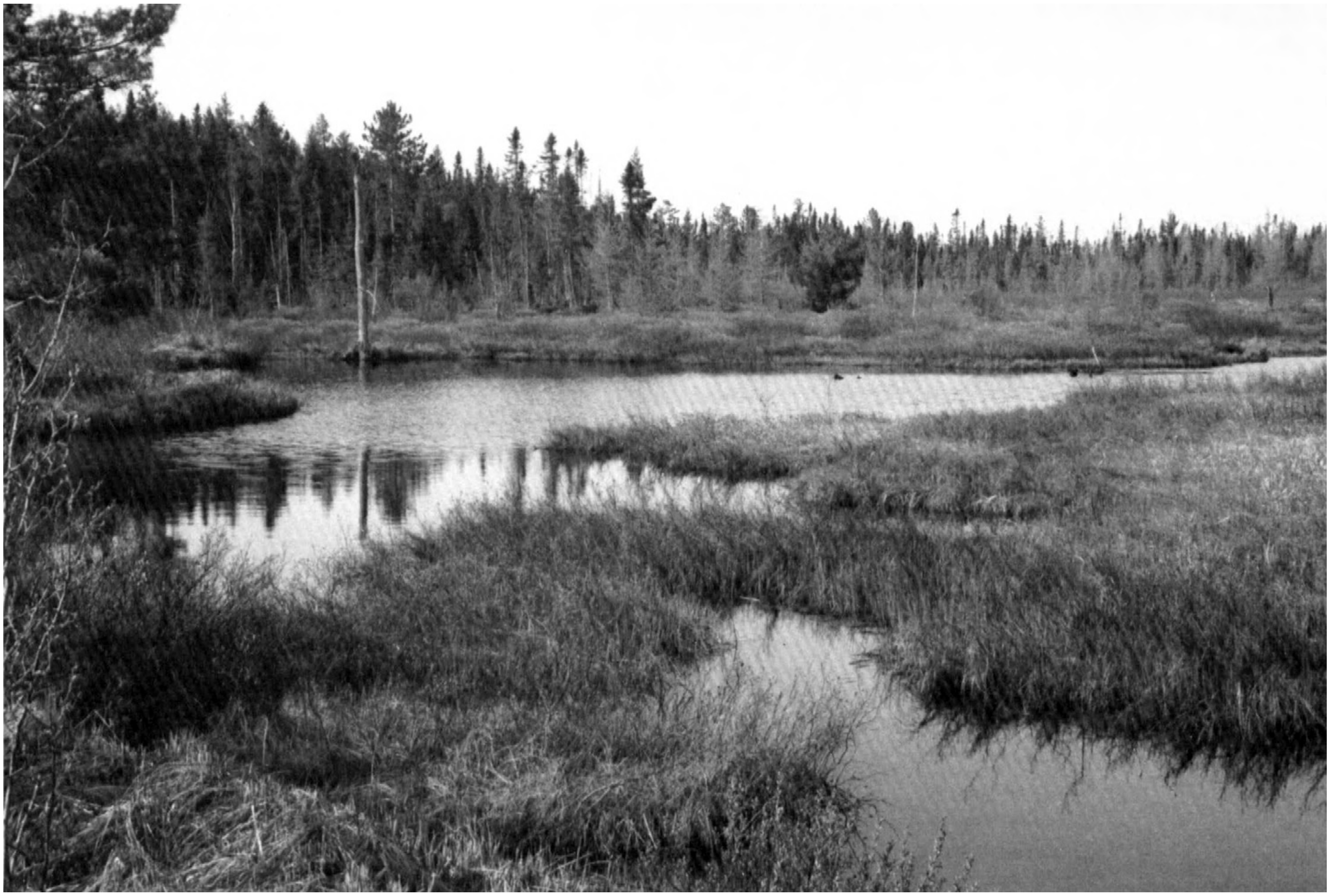


Figure 6.—An area of Histosols and Aquents, ponded. Shallow water areas provide important habitat for wetland wildlife and filter runoff from the surrounding uplands.

mortality, the wetness, and severe plant competition.

These soils are generally unsuited to building site development because of the ponding, subsidence, and low strength. They are generally unsuited to septic tank absorption fields and sewage lagoons because of seepage, the ponding, excess humus, and the slow permeability.

The woodland ordination symbols are 2W and 5W, the land capability classification is VIw, and the Michigan soil management groups are M/4c and Mc. The primary habitat type is TTS.

37—Dawson and Loxley peats. These very deep, nearly level, very poorly drained, organic soils are in swamps and bogs. They are frequently ponded. Individual areas are oval or elongated and range from 5 to several thousand acres in size. Some are made up of only one of these soils, and others are made up of both soils. The two soils are used and managed so similarly that separating them in mapping is not practical.

Typically, the Dawson soil has a surface layer of yellowish brown sphagnum moss about 6 inches thick. Below this is dark reddish brown muck about 12 inches thick. The upper part of the substratum is dark brown and pinkish gray fine sand about 1 inch thick. The lower part to a depth of about 60 inches is dark reddish brown and dark brown loamy fine sand and fine sand. In places the muck is less than 16 inches thick. In some areas very fine sand and silty material underlie the organic deposits.

Typically, the Loxley soil has a surface layer of dark yellowish brown sphagnum moss about 5 inches thick. Below this is black muck about 55 inches thick.

Included with these soils in mapping are small areas of the moderately well drained Croswell, somewhat poorly drained Au Gres, and poorly drained Kinross soils. Croswell and Au Gres soils are on low ridges and knolls. Kinross soils are along the edges of the unit, in landscape positions similar to or slightly higher than those of the Dawson and Loxley soils. Included soils make up about 5 to 15 percent of the map unit.

Permeability is moderately slow to moderately rapid in the organic layers of the Dawson soil and rapid in the sandy substratum. It is moderately slow to moderately rapid in the Loxley soil. The available water capacity is high in both soils. The water table is 1 foot above to 1 foot below the surface from fall to early summer and seldom drops below a depth of 1 foot. Surface runoff is very slow or ponded. The potential for frost action is high.

These soils support native bog vegetation and widely scattered black spruce. The extremely acid organic material and wetness limit tree growth. The opportunities for logging are limited because of the very small number of trees and the instability of the muck. The trees can be logged only during periods in winter when logging roads are frozen.

These soils are generally unsuited to building site development because of the ponding, subsidence, and low strength. They are generally unsuited to septic tank absorption fields and sewage lagoons because of seepage, the ponding, excess humus, and the restricted permeability.

The woodland ordination symbol is 2W, the land capability classification is VIIw, and the Michigan soil management group is Mc-a. The primary habitat type is PCS.

38F—Deer Park-Kinross complex, 0 to 50 percent slopes. This map unit consists of a very deep, nearly level to very steep, excessively drained Deer Park soil on ridges, knolls, and side slopes and a deep, nearly level, poorly drained Kinross soil in swales and depressions between the ridges. The Kinross soil is frequently ponded. Individual areas of this unit are irregular in shape and range from 50 to 1,000 acres in size. They are 40 to 60 percent Deer Park soil and 30 to 50 percent Kinross soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Deer Park soil has a surface layer of very dark gray fine sand about 1 inch thick. The subsurface layer is light brownish gray fine sand about 7 inches thick. The subsoil is yellowish brown and reddish yellow, loose fine sand about 43 inches thick. The substratum to a depth of about 60 inches is light brown sand. In places the soil is mottled in the lower part of the substratum.

Typically, the Kinross soil has a surface layer of black muck about 5 inches thick. The subsurface layer is brown sand about 5 inches thick. The subsoil is dark brown and brown, mottled, very friable and loose sand about 32 inches thick. The substratum to a depth of about 60 inches is grayish brown sand. In places the upper part of the subsoil does not have the dark brown color.

Included with these soils in mapping are small areas of the somewhat poorly drained Au Gres and Wainola soils. These included soils are slightly higher on the landscape than the Kinross soil. Also included are small areas of Dawson and Markey soils. These soils formed in organic material 16 to 50 inches deep over sand. They are in landscape positions similar to or slightly lower than those of the Kinross soil. Included soils make up about 15 to 25 percent of the map unit.

Permeability is rapid in the Deer Park and Kinross soils, and the available water capacity is low. Surface runoff is slow on the Deer Park soil and very slow or ponded on the Kinross soil. The Kinross soil has a seasonal high water table above the surface or within a depth of 1 foot from fall to early summer.

These soils are used as woodland. The major management concerns are the equipment limitation, the erosion hazard, seedling mortality, the windthrow hazard, and plant competition. The use of equipment is limited by the slope and the wetness. Where possible, logging roads and skid trails should be located on the higher, drier sites. The roads should be designed so that they conform to the natural slope of the land. Erosion on the ridges can result from the concentration of runoff on roads, in the tracks of wheeled equipment, and on landings. Fill material and culverts are needed if the roads are built in the depressions and swales. In low areas equipment can be used only during dry summer months or during periods in winter when logging roads are frozen. Suitable sites for log landings are limited to the more nearly level areas at the base of ridges. Jack pine and red pine are the dominant cover types on the higher ridges. The swamp conifer cover type is dominant in the swales. Seedling mortality is a problem because of the low available water capacity on the ridges. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Some replanting may be necessary. Trees in the swales are shallow rooted because of the high water table. Some may be blown down during periods of high winds. After the overstory is removed, plant competition is severe in the low areas.

Because of the complex nature of this map unit, onsite investigation is needed to determine the suitability for building site development, septic tank absorption fields, and sewage lagoons.

The woodland ordination symbols are 4R and 2W, the land capability classification is VIIs, and the

Michigan soil management groups are 5.3a and 5c. The primary habitat type is PVC, and the secondary habitat type is TTS.

39D—Au Gres-Dawson-Rubicon complex, 0 to 15 percent slopes. This map unit consists of a very deep, nearly level, somewhat poorly drained Au Gres soil; a very deep, nearly level, very poorly drained Dawson soil; and a very deep, gently rolling and rolling, excessively drained Rubicon soil. The Au Gres soil is on low ridges and in depressions. The Dawson soil is in swales and depressions and is frequently ponded. The Rubicon soil is on ridges. Individual areas of this unit are elongated or irregularly shaped and range from 10 to 1,000 acres in size. They are 20 to 40 percent Au Gres soil, 20 to 40 percent Dawson soil, and 15 to 30 percent Rubicon soil. The three soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Au Gres soil is covered by about 1 inch of well decomposed leaf litter. The surface layer is black sand about 1 inch thick. The subsurface layer is pinkish gray sand about 4 inches thick. The subsoil is mottled sand about 19 inches thick. The upper part is yellowish red and very friable, and the lower part is strong brown and loose. The substratum to a depth of about 60 inches is brownish yellow and light yellowish brown, mottled sand.

Typically, the Dawson soil has a surface layer of yellowish brown sphagnum moss about 6 inches thick. Below this is dark reddish brown muck about 12 inches thick. The upper part of the substratum is dark brown and pinkish gray fine sand about 1 inch thick. The lower part to a depth of about 60 inches is dark reddish brown and dark brown loamy fine sand and fine sand. In places the organic layers are more than 51 inches thick.

Typically, the Rubicon soil is covered by about 1 inch of partially decomposed leaf litter. The surface layer is very dark gray sand about 1 inch thick. The subsurface layer is grayish brown sand about 2 inches thick. The subsoil is brown and yellowish brown, very friable and loose sand about 17 inches thick. The substratum to a depth of about 60 inches is light brown sand. In places the soil is mottled in the lower part.

Included with these soils in mapping are small areas of the poorly drained Kinross and very poorly drained Markey soils. These included soils are in landscape positions similar to those of the Dawson soil. Markey soils are less acid than the Dawson soil. Included soils make up about 5 to 10 percent of the map unit.

Permeability is rapid in the Au Gres and Rubicon soils. It is moderately slow to moderately rapid in the organic layers of the Dawson soil and rapid in the sandy lower part. The available water capacity is low in the Au Gres and Rubicon soils and high in the Dawson soil. Surface runoff is slow on the Au Gres and Rubicon soils and very slow or ponded on the Dawson soil. The Au Gres soil has a seasonal high water table at a depth of 0.5 foot to 1.5 feet from late fall to late spring. The water table in the Dawson soil is above the surface or within a depth of 1 foot from fall to early summer. It seldom drops below a depth of 2 feet. The potential for frost action is high in the Dawson soil.

These soils are used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Where possible, logging roads and skid trails should be located on the higher, drier sites. Year-round logging roads require fill and a gravel base. Culverts are needed to maintain the natural drainage system. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. Landings should be located in the less sloping, drier areas. In low areas access is limited to the dry summer months or to winter months when logging roads and skid trails are frozen. Jack pine and red pine are the dominant cover types on the higher ridges. Aspen and swamp conifers are the dominant cover types in the lower areas. The organic areas support scattered black spruce and native bog vegetation. Seedling mortality is a problem because of the low available water capacity on the ridges. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. Trees in low areas are shallow rooted because of the high water table. Some may be blown down during periods of high winds. After the overstory is removed, plant competition is severe in the low areas.

Because of the complex nature of this map unit, onsite investigation is needed to determine the suitability for building site development, septic tank absorption fields, and sewage lagoons.

The woodland ordination symbols are 6W, 2W, and 4S; the land capability classification is IVw; and the Michigan soil management groups are 5b, Mc-a, and 5.3a. The primary habitat type is TMC, and the secondary habitat type is PCS.

40A—Rudyard-Allendale complex, 0 to 3 percent slopes. These very deep, nearly level, somewhat poorly drained soils are on broad, low plains. Individual areas are irregular in shape and range from 10 to 100 acres in size. They are 50 to 70 percent Rudyard soil and 20 to 40 percent Allendale soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Rudyard soil has a surface layer of brown, silty clay loam about 6 inches thick. The subsoil is about 11 inches thick. It is mottled and firm. The upper part is brown silty clay loam and gray and grayish brown silt loam. The lower part is reddish brown clay. The substratum to a depth of about 60 inches is reddish brown, mottled clay. In places it is varved or stratified with thin bands of silt loam and silty clay loam.

Typically, the Allendale soil has a surface layer of black loamy fine sand about 5 inches thick. The subsurface layer is pinkish gray fine sand about 3 inches thick. The subsoil is about 27 inches thick. The upper part is dark reddish brown, very friable loamy fine sand; the next part is strong brown and yellowish brown, mottled, very friable fine sand; and the lower part is reddish brown, mottled, firm silty clay. The substratum to a depth of about 60 inches is light reddish brown, mottled silty clay that has thin strata of yellowish brown silt loam and silty clay loam. In places the surface layer is fine sand or loamy sand.

Included with these soils in mapping are small areas of the moderately well drained Halfaday and poorly drained Pickford and Fibre soils. Halfaday soils are on low ridges and knolls. Pickford and Fibre soils are in depressions and drainageways. Included soils make up about 5 to 15 percent of the map unit.

Permeability is very slow in the Rudyard soil. It is moderately rapid and rapid in the sandy upper part of the Allendale soil and very slow in the clayey lower part. The available water capacity is moderate in both soils. Surface runoff is medium. From fall to late spring, a perched seasonal high water table is at a depth of 0.5 foot to 1.5 feet in the Rudyard soil and at a depth of 1 to 2 feet in the Allendale soil. The Rudyard soil has a high shrink-swell potential.

Most areas are used as woodland. Some are used as cropland or pasture.

The major concerns in managing woodland are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the high water table, the use of equipment is restricted to periods when the soils are dry or have an adequate snow cover. When the soils in the clayey areas are wet, unsurfaced logging roads are slippery and ruts form easily. In the sandy areas, loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. Landings can be used only when the soils are dry or frozen. Landings should be stabilized so that they can withstand the repeated use of heavy equipment. Year-round logging roads should be graveled. Culverts are needed to maintain the natural drainage system. Because of the wetness, trees on these soils are shallow rooted. Some may be blown down during periods of high winds. The aspen cover type is dominant on these soils. Clearcutting is common. The mortality of planted seedlings can be expected because of the wetness. Selection of special planting stock, such as containerized seedlings, and special site preparation that protects the surface with thin layers of loose slash can reduce the seedling mortality rate. Furrowing before planting also can increase the seedling survival rate. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

These soils are fairly well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management needs are measures that remove excess water during wet periods, maintain tilth, and help to control soil blowing. Shallow surface ditches and subsurface drains can help to remove excess water if adequate outlets are available. Erosion-control structures may be needed where surface ditches enter outlet drainageways. In the clayey areas, working the soils when they are wet results in surface compaction and the formation of clods. Additions of organic material and a system of conservation tillage that does not invert the soil and that leaves the crop residue on the surface can minimize crusting and soil blowing and increase the rate of water infiltration. Planting small grain crops or hay improves soil structure and permeability and helps to control soil blowing. Buffer strips, vegetative barriers, and field windbreaks help to control soil blowing.

These soils are well suited to pasture. Overgrazing or grazing when the soil is wet can cause surface compaction and destroy forage plants. The forage species that can tolerate wetness, such as trefoil-grass mixtures, should be selected for planting. Proper stocking rates, rotation grazing, and restricted grazing during wet periods help to keep the pasture in good condition.

Because of the complex nature of this map unit, onsite investigation is needed to determine the suitability for building site development, septic tank absorption fields, and sewage lagoons.

The woodland ordination symbols are 6W and 4W, the land capability classification is IIIw, and the Michigan soil management groups are 0b and 4/1b. The primary habitat type is TTP, and the secondary habitat type is TMC-D.

41D—Summerville-Rock outcrop complex, 1 to 15 percent slopes. This map unit occurs as areas of a shallow, well drained, nearly level to rolling Summerville soil and exposed limestone bedrock on benches, ridgetops, and broad plains. The Rock outcrop occurs as flat areas or vertical drops of 5 to 15 feet. Individual areas of this unit are irregular in shape and range from

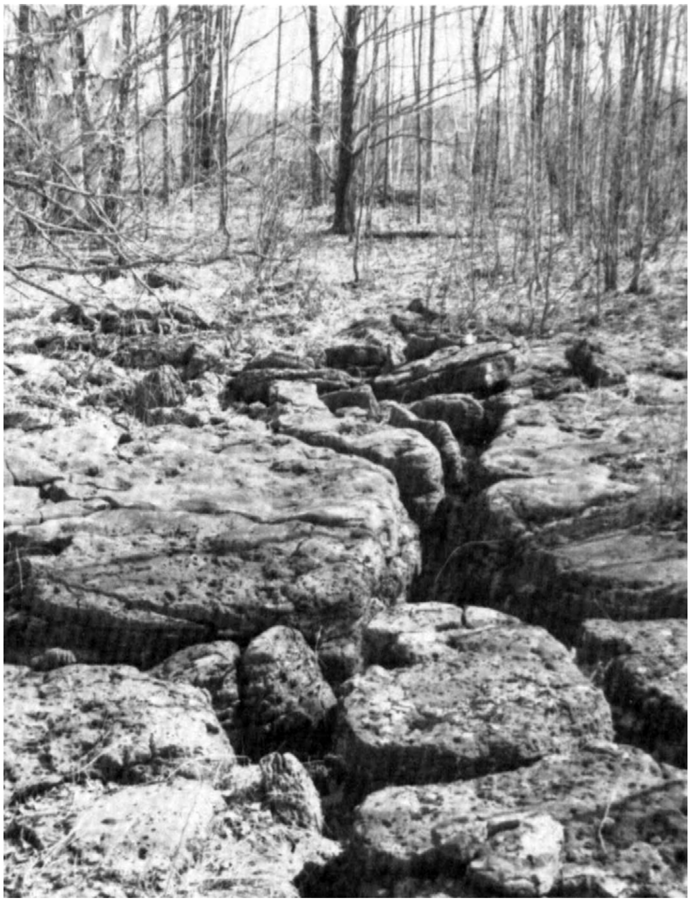


Figure 7.—Rock outcrop in an area of Summerville-Rock outcrop complex, 1 to 15 percent slopes. The exposed bedrock can hinder the use of equipment.

10 to 1,000 acres in size. They are 30 to 70 percent Summerville soil and 20 to 70 percent Rock outcrop. The Summerville soil and Rock outcrop occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Summerville soil has a surface layer of very dark grayish brown loam about 3 inches thick. The subsoil is dark yellowish brown, very friable very fine sandy loam about 10 inches thick. Limestone bedrock is at a depth of about 13 inches. In some areas the subsoil has 5 to 35 percent gravel, cobbles, or flagstones.

Included with this unit in mapping are small areas of the well drained Posen and somewhat poorly drained Ensign soils. Posen soils are deep. They are in landscape positions similar to those of the Summerville soil. Ensign soils are in depressions. Also included are areas of the stony or bouldery Summerville soils. Included soils make up about 5 to 15 percent of the map unit.

Permeability is moderate in the Summerville soil. The available water capacity is low. Surface runoff is slow.

Most areas are used as woodland. A small acreage is idle grassland.

The major concerns in managing woodland are the equipment limitation, seedling mortality, and the windthrow hazard. The bedrock and the Rock outcrop can interfere with the construction of logging roads and log landings and with harvesting (fig. 7). The use of equipment is limited by the exposed bedrock. Landings can be located in the nearly level areas. Trafficability is briefly limited in spring and in other excessively wet periods. When the Summerville soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. The northern hardwoods cover type is dominant on the Summerville soil. Species preference can be managed by selective cutting. Selection of special planting stock, such as containerized seedlings, and special site preparation that protects the surface with thin layers of loose slash can reduce the seedling mortality rate. Furrowing before planting also can increase the seedling survival rate. Because of the bedrock, the trees are shallow rooted. Many may be blown down during periods of high winds.

The Summerville soil is generally unsuited to building site development and septic tank absorption fields because of the shallowness to bedrock.

The woodland ordination symbol assigned to the Summerville soil is 2D, the land capability classification is IVe, and the Michigan soil management group is Ra. The primary habitat type is TM, and the secondary habitat type is ATD.

41F—Summerville-Rock outcrop complex, 15 to 45 percent slopes. This map unit occurs as areas of a shallow, well drained, rolling to very steep Summerville soil and exposed limestone bedrock on benches and the sides of ridges. The Rock outcrop occurs as flat areas or vertical drops of 5 to 25 feet. In some areas, particularly Marblehead on Drummond Island, the vertical drops are as much as 60 feet. Individual areas of this unit are elongated and range from 10 to 100 acres in size. They are 30 to 70 percent Summerville soil and 20 to 70 percent Rock outcrop. The Summerville soil and Rock outcrop occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Summerville soil has a surface layer of very dark grayish brown loam about 3 inches thick. The subsoil is dark yellowish brown, very friable very fine sandy loam about 10 inches thick. Limestone bedrock is at a depth of about 13 inches. In some areas the subsoil has 25 to 35 percent gravel, cobbles, or flagstones.

Included with this unit in mapping are small areas of the deep, well drained Posen soils. These soils are in landscape positions similar to those of the Summerville soil. Also included are areas of the stony or bouldery Summerville soils. Included soils make up about 5 to 10 percent of the map unit.

Permeability is moderate in the Summerville soil. The available water capacity is low. Surface runoff is medium.

This map unit is used as woodland. The major management concerns are the equipment limitation, the erosion hazard, seedling mortality, and the windthrow hazard. The use of equipment is restricted by the slope and the Rock outcrop. Logging roads and skid trails should be constructed in the less sloping areas or designed so that they conform to the natural slope of the land. The Rock outcrop can interfere with the construction of logging roads and log landings and with harvesting. When the Summerville soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. The northern hardwoods cover type is dominant on this soil. Selection of special planting stock, such as containerized seedlings, and special site preparation that protects the surface with thin layers of loose slash can reduce the seedling mortality rate. Furrowing before planting also can increase the seedling survival rate. Species preference can be managed by selective cutting. Because of the bedrock, the trees are shallow rooted. Many may be blown down during periods of high winds.

The Summerville soil is generally unsuited to building site development and septic tank absorption fields because of the shallowness to bedrock and the slope.

The woodland ordination symbol assigned to the Summerville soil is 2R, the land capability classification is VIIe, and the Michigan soil management group is Ra. The primary habitat type is TM, and the secondary habitat type is ATD.

42D—Emmet-Kalkaska complex, 1 to 15 percent slopes. This map unit consists of very deep, nearly level to rolling, well drained Emmet and somewhat excessively drained Kalkaska soils. The Emmet soil is on small flats and broad plains, and the Kalkaska soil is on ridges and knolls. Individual areas of this unit are irregular in shape and range from 10 to 300 acres in size. They are 40 to 60 percent Emmet soil and 30 to 50 percent Kalkaska soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Emmet soil has a surface layer of black sandy loam about 6 inches thick. The subsoil is brown and reddish brown, friable sandy loam about 23 inches thick. The substratum to a depth of about 60 inches is reddish brown sandy loam that has thin lenses of brown loamy sand. In places the surface layer is fine sandy loam.

Typically, the Kalkaska soil is covered by about 1 inch of partially decomposed leaf litter. The surface layer is dark reddish brown sand about 2 inches thick. The subsurface layer is reddish brown sand about 5 inches thick. The subsoil is about 24 inches thick. The upper part is dark reddish brown, very friable loamy sand, and the lower part is dark brown and strong brown, friable and loose sand. The substratum to a depth of about 60 inches is light yellowish brown sand. In places the soil has 5 to 15 percent gravel and cobbles on or below the surface.

Included with these soils in mapping are small areas of the well drained Longrie and Menominee soils. These included soils are in landscape positions similar to those of the Emmet soil. Longrie soils have limestone bedrock between depths of 20 and 40 inches. Menominee soils formed in sandy material over loamy deposits. Included soils make up about 5 to 10 percent of the map unit.

Permeability is moderate in the Emmet soil and rapid in the Kalkaska soil. The available water capacity is moderate in the Emmet soil and low in the Kalkaska soil. Surface runoff is slow on both soils.

Most areas are used as woodland. The major management concerns are the equipment limitation, seedling mortality, and plant competition. In the loamy areas, trafficability may be briefly limited in spring and in other excessively wet periods. In heavily traveled sandy areas, loose sand can interfere with the traction of wheeled equipment, especially during dry periods. Logging roads should be graveled. Landings can be located in the nearly level areas. The northern hardwoods cover type is dominant on these soils. In the sandy areas, the mortality of planted or naturally established seedlings can be a problem during dry periods because of the low available water capacity. Selection of special planting stock, such as containerized seedlings, and special site preparation that protects the surface with thin layers of loose slash can reduce the seedling mortality rate. Furrowing before planting also can increase the seedling survival rate. Species preference can be managed by selective cutting. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

These soils are fairly well suited to building site development. The slope is a limitation, however, in areas where it is more than 8 percent. The Emmet soil is fairly well suited to septic tank absorption fields, but the Kalkaska soil is poorly suited. The restricted permeability in the Emmet soil, a poor filtering capacity in the Kalkaska soil, and the slope are limitations. The soils are generally unsuited to sewage lagoons because of seepage and the slope. Buildings should be designed so that they conform to the natural slope of the land. The Kalkaska soil readily absorbs but does not adequately filter the effluent in septic tank absorption fields. The poor filtering capacity can result in the pollution of ground water. Special construction methods, such as enlarging the absorption fields or installing alternating drain fields, can help to overcome the restricted permeability of the Emmet soil. Land shaping and installing the distribution lines across the slope help to ensure that the absorption field functions properly.

The woodland ordination symbols are 3L and 3S, the land capability classification is IIIe, and the Michigan soil management groups are 3a and 5a. The primary habitat type is AVO-A, and the secondary habitat type is ATD.

44B—Posen stony fine sandy loam, 1 to 6 percent slopes. This very deep, well drained, nearly level and undulating soil is on broad plains and the tops of ridges. Stones and small boulders are on the surface. They range from 10 to more than 50 inches in diameter and are 350 to less than 25 feet apart. Individual areas of this soil are irregular in shape and range from 3 to more than 600 acres in size.

Typically, the surface is covered by about 1 inch of partially decomposed leaf litter. The surface layer is very dark gray stony fine sandy loam about 3 inches thick. The subsoil is about 13 inches of dark brown and brown, friable stony silt loam and silt loam. The substratum to a depth of about 60 inches is brown very gravelly fine sandy loam. In places the surface layer is gravelly fine sandy loam or the gravelly or cobbly analogs of loam or silt loam.

Included with this soil in mapping are small areas of the well drained Longrie and somewhat poorly drained Shelter soils. Longrie soils have limestone bedrock at a depth of 20 to 40 inches. They are in landscape positions similar to those of the Posen soil. Shelter soils are in depressions. Included soils make up about 5 to 15 percent of the map unit.

Permeability is moderate in the Posen soil. The available water capacity also is moderate. Surface runoff is slow.

Most areas are used as woodland. The major management concerns are the equipment limitation and plant competition. Trafficability may be briefly limited in spring and in other excessively wet periods. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Deep ruts tend to restrict lateral drainage, expose tree roots, and alter soil structure. Large stones on the surface can hinder harvesting and planting and can result in equipment damage. Year-round logging roads should be graveled. The northern hardwoods cover type is dominant on this soil. If seedlings are planted, site preparation by mechanical or chemical means generally is needed to control plant competition. Species preference can be managed by selective cutting.

This soil is poorly suited to building site development and septic tank absorption fields because of the large stones on the surface and coarse fragments. The coarse fragments should be removed. The soil is generally unsuited to sewage lagoons because of the coarse fragments.

The woodland ordination symbol is 2X, the land capability classification is IIIs, and the Michigan soil management group is 3a. The primary habitat type is AVO.

44D—Posen stony fine sandy loam, 6 to 15 percent slopes. This very deep, well drained, gently rolling and rolling soil is on the sides of ridges and knolls. Stones and small boulders are on the surface. They range from 10 to more than 50 inches in diameter and are 350 to less than 25 feet apart. Individual areas of this soil are irregularly shaped or elongated and range from 5 to 80 acres in size.

Typically, the surface is covered by about 1 inch of partially decomposed leaf litter. The surface layer is very dark gray stony fine sandy loam about 3 inches thick. The subsoil is about 13 inches of dark brown and brown, friable stony and very cobbly silt loam. The substratum to a depth of about 60 inches is brown very gravelly fine sandy loam. In places the surface layer is gravelly fine sandy loam or the gravelly or cobbly analogs of loam or silt loam.

Included with this soil in mapping are small areas of the well drained Longrie soils. These soils are in landscape positions similar to those of the Posen soil. They have limestone bedrock at a depth of 20 to 40 inches. They make up about 5 to 15 percent of the map unit.

Permeability is moderate in the Posen soil. The available water capacity also is moderate. Surface runoff is slow.

Most areas are used as woodland. The major management concerns are the equipment limitation and plant competition. Trafficability may be briefly limited in spring and in other excessively wet periods. When the soil is wet, unsurfaced logging roads are slippery. Large stones on the surface can hinder harvesting and planting and can result in equipment damage. Year-round logging roads should be graveled. Landings can be located in the small nearly level areas that may be included in this unit. The northern hardwoods cover type is dominant on this soil. If seedlings are planted, site preparation by mechanical or chemical means generally is needed to control plant competition. Species preference can be managed by selective cutting.

This soil is poorly suited to building site development because of the large stones on the surface. It is poorly suited to septic tank absorption fields because of the large stones and the slope. The large stones can cause construction problems and should be removed. Buildings should be designed so that they conform to the natural slope of the land. Retaining walls may be needed. Land shaping and installing the distribution lines across the slope help to ensure that septic tank absorption fields function properly.

The woodland ordination symbol is 2X, the land capability classification is VIs, and the Michigan soil management group is 3a. The primary habitat type is AVO.

44E—Posen stony fine sandy loam, 15 to 35 percent slopes. This very deep, well drained, rolling to steep soil is on the sides of ridges and knolls. Stones and small boulders are on the surface. They range from 10 to more than 50 inches in diameter and are 350 to less than 25 feet apart. Individual areas of this soil are elongated and range from 5 to 40 acres in size.

Typically, the surface is covered by about 1 inch of partially decomposed leaf litter. The surface layer is very dark gray stony fine sandy loam about 3 inches thick. The subsoil is about 13 inches of dark brown and brown, friable stony and very cobbly silt loam. The substratum to a depth of about 60 inches is brown very gravelly fine sandy loam. In places the surface layer is gravelly fine sandy loam or the gravelly or cobbly analogs of loam or silt loam.

Included with this soil in mapping are small areas of the well drained Longrie soils. These soils are in landscape positions similar to those of the Posen soil. They have limestone bedrock at a depth of 20 to 40 inches. They make up about 5 to 15 percent of the map unit.

Permeability is moderate in the Posen soil. The available water capacity also is moderate. Surface runoff is medium.

This soil is used as woodland. The major management concerns are the equipment limitation, the erosion hazard, and plant competition. The use of equipment is limited because of the slope. Logging roads and skid trails should be constructed in the less sloping areas or on ridgetops. Establishing logging roads and skid trails on the contour can minimize erosion. Trafficability may be briefly limited in spring and in other excessively wet periods. When the soil is wet, unsurfaced logging roads are slippery. Large stones on the surface can hinder harvesting and planting and can result in equipment damage. Year-round logging roads should be graveled. The northern hardwoods cover type is dominant on this soil. If seedlings are planted, site preparation by mechanical or chemical means generally is needed to control plant competition. Species preference can be managed by selective cutting.

This soil is generally unsuited to building site development and septic tank absorption fields because of the slope and the large stones.

The woodland ordination symbol is 2R, the land capability classification is VIIs, and the Michigan soil management group is 3a. The primary habitat type is AVO.

46B—Pence loamy sand, 0 to 6 percent slopes. This very deep, well drained, nearly level and undulating soil is on upland flats and broad plains. Individual areas are irregular in shape and range from 3 to 1,000 acres in size.

Typically, the surface layer is black loamy sand about 1 inch thick. The subsurface layer is brown loamy sand about 3 inches thick. The subsoil is 24 inches thick. The upper part is dark reddish brown and dark brown, very friable sandy loam. The lower part is strong brown, loose sand and coarse sand. The substratum to a depth of about 60 inches is strong brown gravelly coarse sand.

Included with this soil in mapping are small areas of the somewhat excessively drained Kalkaska and moderately well drained Alcona soils. These soils are in landscape positions similar to those of the Pence soil. Kalkaska soils are sandy throughout. Alcona soils are finer textured throughout than the Pence soil. Also included are areas of cobbly or stony Pence soils. Included soils make up about 5 to 10 percent of the map unit.

Permeability is moderately rapid and rapid in the upper part of the Pence soil and rapid in the lower part. The available water capacity is low. Surface runoff is slow.

Most areas are used as woodland. A few are used as cropland or pasture.

The major management concern for woodland is the equipment limitation. Trafficability may be briefly limited in spring and in other excessively wet periods. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting.

This soil is fairly well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management needs are measures that control erosion, conserve moisture, and help to control soil blowing. Examples are buffer strips, vegetative barriers, field windbreaks, grassed waterways, and a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface.

This soil is well suited to pasture. Overgrazing during dry periods can destroy the plant cover. Proper stocking rates, rotation grazing, strip grazing, and restricted use during dry periods help to keep the pasture in good condition and prevent excessive erosion.

This soil is well suited to building site development. It is poorly suited to septic tank absorption fields because of a poor filtering capacity. It readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. The soil is generally unsuited to sewage lagoons because of seepage.

The woodland ordination symbol is 3S, the land capability classification is IIIe, and the Michigan soil management group is 5a. The primary habitat type is ATD.

46D—Pence loamy sand, 6 to 15 percent slopes. This very deep, well drained, gently rolling and rolling soil is on ridges and knolls. Individual areas are irregular in shape and range from 3 to 400 acres in size.

Typically, the surface layer is black loamy sand about 1 inch thick. The subsurface layer is brown loamy sand about 3 inches thick. The subsoil is 24 inches thick. The upper part is dark reddish brown and dark brown, very friable sandy loam. The lower part is strong brown, loose sand and coarse sand. The substratum to a depth of about 60 inches is strong brown gravelly coarse sand.

Included with this soil in mapping are small areas of the moderately well drained Alcona and somewhat excessively drained Kalkaska soils. These soils are in landscape positions similar to those of the Pence soil. Alcona soils are finer textured throughout than the Pence soil. Kalkaska soils are sandy throughout. Also included are areas of cobbly or stony Pence soils. Included soils make up about 5 to 10 percent of the map unit.

Permeability is moderately rapid and rapid in the upper part of the Pence soil and rapid in the lower part. The available water capacity is low. Surface runoff is slow.

This soil is used as woodland. The major management concern is the equipment limitation. Trafficability may be briefly limited in spring and in other excessively wet periods. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting.

This soil is fairly well suited to building site development. The slope is the main limitation. The soil is poorly suited to septic tank absorption fields because of a poor filtering capacity. It is generally unsuited to sewage lagoons because of seepage and the slope. Buildings should be designed so that they conform to the natural slope of the land. The soil readily absorbs but does not adequately filter the effluent in septic tank absorption fields. The poor filtering capacity can result in the pollution of ground water.

The woodland ordination symbol is 3S, the land capability classification is IVe, and the Michigan soil management group is 5a. The primary habitat type is ATD.

46E—Pence loamy sand, 15 to 35 percent slopes. This very deep, well drained, rolling to steep soil is on ridges and knolls. Individual areas are irregularly shaped or elongated and range from 3 to 300 acres in size.

Typically, the surface layer is black loamy sand about 1 inch thick. The subsurface layer is brown loamy sand about 3 inches thick. The subsoil is about 24 inches thick. The upper part is dark reddish brown and dark brown, very friable sandy loam. The lower part is strong brown, loose sand and coarse sand. The substratum to a depth of about 60 inches is strong brown gravelly coarse sand.

Included with this soil in mapping are small areas of the well drained Alcona and somewhat excessively drained Kalkaska soils. These soils are in landscape positions similar to those of the Pence soil. Alcona soils are finer textured throughout than the Pence soil. Kalkaska soils are sandy throughout. Also included are areas of the cobbly or stony Pence soils. Included soils make up about 5 to 10 percent of the map unit.

Permeability is moderately rapid and rapid in the upper part of the Pence soil and rapid in the lower part. The available water capacity is low. Surface runoff is medium.

This soil is used as woodland. The major management concerns are the equipment limitation and the erosion hazard. The use of equipment is limited because of the slope. Logging roads and skid trails should be constructed in the less sloping areas or on ridgetops. Constructing the roads and skid trails on the contour can minimize erosion. Trafficability may be briefly limited in spring and in other excessively wet periods. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting.

This soil is generally unsuited to building site development because of the slope. It is generally unsuited to septic tank absorption fields and sewage lagoons because of the slope and seepage.

The woodland ordination symbol is 3R, the land capability classification is VIIe, and the Michigan soil management group is 5a. The primary habitat type is ATD.

48E—Wainola-Kinross-Rousseau complex, 0 to 35 percent slopes. This map unit consists of a very deep, nearly level, somewhat poorly drained Wainola soil; a very deep, nearly level, poorly drained Kinross soil; and a very deep, hilly and steep, well drained Rousseau soil. The Wainola soil is in swales and depressions. The Kinross soil is in low swales, depressions, and drainageways and is frequently ponded. The Rousseau soil is on ridges. Individual areas of this unit are elongated or irregularly shaped and range from 10 to 600 acres in size. They are 30 to 50 percent Wainola soil, 20 to 30 percent Kinross soil, and 15 to 25 percent Rousseau soil. The three soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Wainola soil is covered with about 3 inches of black, partially decomposed leaf litter. The surface layer is grayish brown fine sand about 5 inches thick. The subsoil is dark reddish brown, strong brown, and yellowish brown, mottled, friable fine sand about 19 inches thick. The substratum to a depth of about 60 inches is brown fine sand.

Typically, the Kinross soil has a surface layer of black muck about 3 inches thick. The subsurface layer is dark gray fine sand about 7 inches thick. The subsoil is dark brown and brown, mottled, loose fine sand about 15 inches thick. The substratum to a depth of about 60 inches is brown fine sand.

Typically, the Rousseau soil is covered by well decomposed leaf litter about 1 inch thick. The surface layer is dark brown and brown fine sand about 1 inch thick. The subsurface layer is brown fine sand about 3 inches thick. The subsoil is fine sand about 22 inches thick. The upper part is dark brown and strong brown and very friable. The lower part is yellowish brown and loose. The substratum to a depth of about 60 inches is brownish yellow fine sand.

Included with these soils in mapping are small areas of the very poorly drained Markey soils. These included soils are in landscape positions similar to those of the Kinross soil. They formed in organic material 16 to 51 inches deep over sand and fine sand. They make up about 5 to 10 percent of the map unit.

Permeability is rapid in the Wainola, Kinross, and Rousseau soils, and the available water capacity is low. Surface runoff is very slow or ponded on the Kinross soil and slow on the Wainola and Rousseau soils. The Kinross soil has a seasonal high water table 1 foot above to 1 foot below the surface from fall to early summer. The Wainola soil has one at a depth of 0.5 foot to 1.5 feet from late fall to late spring.

These soils are used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Where possible, logging roads, skid trails, and landings should be located on the higher, drier sites. Year-round logging roads require fill and a gravel base. Culverts are needed to maintain the natural drainage system. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. Landings should be located in the less sloping, drier areas. In low areas access is limited to the dry summer months or to winter months when logging roads and skid trails are frozen. Jack pine and red pine are the dominant cover types on the higher ridges. Aspen and swamp conifers are the dominant cover types in the lower areas. Seedling mortality is a problem because of the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. Trees in low areas are shallow rooted because of the high water table. Some may be blown down during periods of high winds. Special harvest methods and site preparation may be needed to control plant competition.

Because of the complex nature of this map unit, onsite investigation is needed to determine the suitability for building site development, septic tank absorption fields, and sewage lagoons.

The woodland ordination symbols are 6W, 2W, and 5R; the land capability classification is IIIw; and the Michigan soil management groups are 5b, 5c, and 4a. The primary habitat type is TMC, and the secondary habitat type is TTS.

49A—Wainola fine sand, 0 to 3 percent slopes. This very deep, somewhat poorly drained, nearly level soil is on low plains and in depressions. Individual areas are irregular in shape and range from 5 to 200 acres in size.

Typically, the surface is covered with about 3 inches of black, partially decomposed leaf litter. The surface layer is grayish brown fine sand about 5 inches thick.

The subsoil is dark reddish brown, strong brown, and yellowish brown, mottled, friable fine sand about 19 inches thick. The substratum to a depth of about 60 inches is brown fine sand.

Included with this soil in mapping are small areas of the moderately well drained Rousseau and poorly drained Deford soils. Rousseau soils are on low ridges. Deford soils are in depressions and drainageways. Included soils make up about 5 to 15 percent of the map unit.

Permeability is rapid in the Wainola soil. The available water capacity is low. Surface runoff is slow. The seasonal high water table is at a depth of 0.5 foot to 1.5 feet from late fall to late spring.

Most areas are used as woodland. The major management concerns are the equipment limitation, the windthrow hazard, seedling mortality, and plant competition. Because of the high water table, the use of equipment is restricted to dry summer months or to winter months when the snow cover is adequate. Landings can be used only when the soil is dry or frozen. Because of the high water table, trees on this soil are shallow rooted. Some may be blown down during periods of high winds. The aspen cover type is dominant on this soil. Clearcutting is common. Selection of special planting stock, such as containerized seedlings, and special site preparation that protects the surface with thin layers of loose slash can reduce the seedling mortality rate. Furrowing before planting also can increase the seedling survival rate. After the trees are cut, plant competition can delay natural regeneration. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is fairly well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management needs are measures that remove excess water during wet periods, conserve moisture during dry periods, and help to control soil blowing. A combination of surface and subsurface drains can lower the seasonal high water table if drainage outlets are available. Erosion-control structures may be needed where the surface ditches enter the drainageways. Tile lines should be protected with suitable material to prevent their filling with fine sand. Conservation tillage, small grain crops, and additions of organic material can conserve moisture and help to control soil blowing. Buffer strips, vegetative barriers, and field windbreaks help to control soil blowing.

This soil is well suited to pasture. The forage species that are tolerant of wetness, such as trefoil-grass mixtures, should be selected for planting. Overgrazing can destroy forage plants. Proper stocking rates and restricted grazing during wet periods help to keep the pasture in good condition.

This soil is generally unsuited to building site development because of the wetness. It is generally unsuited to septic tank absorption fields because of the wetness and a poor filtering capacity. It is generally unsuited to sewage lagoons because of seepage and the wetness.

The woodland ordination symbol is 6W, the land capability classification is IIIw, and the Michigan soil management group is 5b. The primary habitat type is TMC, and the secondary habitat type is TMC-V.

50—Deford fine sand. This very deep, poorly drained, nearly level soil is on low plains and in depressions. It is frequently ponded. Individual areas are irregular in shape and range from 5 to more than 200 acres in size.

Typically, the surface layer is very dark gray and dark brownish gray fine sand about 4 inches thick. The substratum to a depth of about 60 inches is light yellowish brown, pale brown, and grayish brown, mottled fine sand. In some places the surface layer is loamy fine sand, mucky loamy fine sand, or mucky fine sand. In other places a thin organic layer overlies the surface layer.

Included with this soil in mapping are small areas of the somewhat poorly drained Wainola and very poorly drained Markey soils. Wainola soils are in the slightly higher landscape positions. Markey soils formed in organic material 16 to 51 inches deep over sand. They are in landscape positions similar to or slightly lower than those of the Deford soil. Included soils make up about 5 to 10 percent of the map unit.

Permeability is rapid in the Deford soil. The available water capacity is low. Surface runoff is very slow or ponded. The seasonal high water table is 1 foot above to 1 foot below the surface from fall to early summer.

This soil is used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the high water table, the use of equipment is restricted to dry summer months or to winter months when the snow cover is adequate. Year-round logging roads require fill and a gravel base. Culverts are needed to maintain the natural drainage system. The number of suitable landing sites is severely limited because of the wetness. Because of the high water table, trees on this soil are shallow rooted. Many may be blown down during periods of high winds. The swamp conifer cover type is dominant on this soil. Clearcutting is common. After the trees are cut, competition from wetland brush can delay or prevent natural regeneration. Trees generally are not planted on this soil because of the wetness, severe seedling mortality, plant competition, and low productivity.

This soil is generally unsuited to building site development because of the ponding. It is generally unsuited to septic tank absorption fields because of the ponding and a poor filtering capacity and to sewage lagoons because of seepage and the ponding.

The woodland ordination symbol is 4W, the land capability classification is Vw, and the Michigan soil management group is 5c. No habitat type is assigned.

52A—Ingalls loamy sand, 0 to 3 percent slopes. This very deep, somewhat poorly drained, nearly level soil is on low plains and knolls and in swales. Individual areas are irregular in shape and range from 5 to 350 acres in size.

Typically, the surface is covered by about 3 inches of leaf litter. The surface horizon is brown loamy sand about 7 inches thick. The subsoil is about 33 inches thick. It is mottled. The upper part is dark brown, friable loamy sand and sand, and the lower part is brown, very friable loamy fine sand. The substratum to a depth of about 60 inches is dark yellowish brown and brown, mottled, stratified loamy fine sand and silt loam.

Included with this soil in mapping are small areas of the moderately well drained Ocqueoc soils in the slightly higher landscape positions. Also included are small areas of the somewhat poorly drained Allendale and poorly drained Deford soils. Allendale soils have a clayey substratum. They are in landscape positions similar to those of the Ingalls soil. Deford soils are in depressions and along drainageways. Included soils make up about 5 to 15 percent of the map unit.

Permeability is rapid in the upper part of the Ingalls soil and moderately slow in the stratified lower part. The available water capacity is moderate. Surface runoff is slow. The seasonal high water table is at a depth of 0.5 foot to 1.5 feet from late fall to late spring.

Most areas are used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the high water table, the use of equipment is restricted to dry summer months or to winter months when the snow cover is adequate. Landings can be used only when the soil is dry or frozen. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. Selection of special planting stock, such as containerized seedlings, and special site preparation that protects the surface with thin layers of loose slash can reduce the seedling mortality rate. Furrowing before planting also can increase the seedling survival rate. Because of the high water table, trees on this soil are shallow rooted. Some may be blown down during periods of high winds and excessive wetness. The aspen cover type is dominant on this soil. Clearcutting is common. After the trees are cut, plant competition can delay natural regeneration. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is fairly well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management needs are measures that remove excess water during wet periods and that control soil blowing. A subsurface drainage system can help to lower the water table. Tile lines should be protected with suitable material and installed on a self-cleaning grade so that they do not become clogged with fine sand and silt. Conservation tillage, buffer strips, vegetative barriers, field windbreaks, and additions of organic material conserve moisture and help to control soil blowing.

This soil is well suited to pasture. The forage species that are tolerant of wetness, such as trefoil-grass mixtures, should be selected for planting. Proper stocking rates and restricted grazing during wet periods help to keep the pasture in good condition.

This soil is generally unsuited to building site development because of the wetness and to septic tank absorption fields because of the wetness, the moderately slow permeability in the lower part of the profile, and a poor filtering capacity in the upper part. It is generally unsuited to sewage lagoons because of the wetness and seepage.

The woodland ordination symbol is 4W, the land capability classification is IIIw, and the Michigan soil management group is 4/2b. No habitat type is assigned.

53B—Menominee loamy sand, 0 to 6 percent slopes. This very deep, moderately well drained, nearly level and undulating soil is on broad plains and knolls and on the tops of ridges. Individual areas are irregular in shape and range from 5 to 150 acres in size.

Typically, the surface layer is very dark gray loamy sand about 5 inches thick. The subsurface layer is grayish brown loamy sand about 6 inches thick. The subsoil is about 23 inches thick. The upper part is dark reddish brown, friable loamy sand about 2 inches thick. The next part is strong brown, friable sand. The lower part is reddish brown, mottled, friable clay loam and sandy loam. The substratum to a depth of about 60 inches is reddish brown, mottled sandy loam.

Included with this soil in mapping are small areas of the somewhat excessively drained Kalkaska and well drained Emmet and Longrie soils. These soils are in landscape positions similar to those of the Menominee soil. Kalkaska soils are sandy throughout. Emmet soils are loamy throughout. Longrie soils are underlain by limestone bedrock at a depth of 20 to 40 inches. Included soils make up about 5 to 15 percent of the map unit.

Permeability is rapid in the upper part of the Menominee soil and moderately slow in the lower part. The available water capacity is moderate. Surface runoff is slow. A perched seasonal high water table is at a depth of 2.5 to 4.0 feet from late fall to spring. The potential for frost action is high.

Most areas are used as woodland. Some are used as cropland. Some of the acreage is idle grassland.

Most areas are used as woodland. There are no major management concerns. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is fairly well suited to such crops as oats, wheat, silage corn, and a mixture of grasses and legumes. The major management needs are measures that conserve moisture, help to control soil blowing, and maintain the organic matter content. Examples are buffer strips, vegetative barriers, field windbreaks, additions of organic material, and a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface.

This soil is well suited to pasture. Overgrazing during dry periods can destroy the plant cover. Proper stocking rates, rotation grazing, strip grazing, and restricted grazing during dry periods help to keep the pasture in good condition.

This soil is fairly well suited to building site development. The wetness is a limitation on sites for buildings with basements. These buildings can be constructed on well compacted fill material, which raises the level of the site. A drainage system helps to lower the seasonal high water table. The soil is poorly suited to septic tank absorption fields because of a poor filtering capacity in the upper part of the profile and moderately slow permeability in the lower part. It readily absorbs but does not adequately filter the effluent in the upper part of the profile. Special construction methods, such as enlarging the absorption fields or installing alternating drain fields, can help to overcome the restricted permeability. The wetness can be a limitation. Filling or mounding the absorption field with suitable material can raise the site above the seasonal high water table. The soil is generally unsuited to sewage lagoons because of seepage in the upper part of the profile.

The woodland ordination symbol is 6A, the land capability classification is IIIs, and the Michigan soil management group is 4/2a. No habitat type is assigned.

56A—Ensign silt loam, 0 to 3 percent slopes, rocky. This shallow, somewhat poorly drained, nearly level soil is on broad plains and low knolls and in depressions. Limestone bedrock makes up 1 to 10 percent of this map unit. The rock outcrops are generally flat areas of exposed bedrock, but vertical drops of 5 to 10 feet can occur. Individual areas of this unit are irregular in shape and range from 5 to more than 600 acres in size.

Typically, the surface layer is very dark gray silt loam about 4 inches thick. The next layer is very dark gray and light olive brown, mottled silt loam about 4 inches thick. The subsoil is light olive brown, mottled, friable silt loam about 5 inches thick. Limestone bedrock is at a depth of about 13 inches. In some places the limestone bedrock is below a depth of 20 inches. In other places the soil has a thin surface layer of muck. In some areas the surface layer and subsoil have 25 to 35 percent gravel, cobbles, and flagstones.

Included with this soil in mapping are small areas of the well drained Summerville, somewhat poorly drained Shelter, and poorly drained Ruse soils. Summerville soils are on low knolls and benches. Shelter soils do not have bedrock within a depth of 40 inches. They are in landscape positions similar to those of the Ensign soil. Ruse soils are in depressions. Included soils make up about 5 to 15 percent of the map unit.

Permeability is moderate in the Ensign soil. The available water capacity is low. Surface runoff is slow. The seasonal high water table is at a depth of 0.5 to 1.0 foot from late fall to late spring.

This soil is used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the high water table, the use of equipment is restricted to dry summer months or to winter months when the snow cover is adequate. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. Bedrock and rock outcrops can hinder road construction, harvesting, and planting. Landings can be used only when the soil is dry or frozen. Because of the bedrock and the high water table, trees on this soil are shallow rooted. Some may be blown down during periods of high winds. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the low available water capacity. Aspen and swamp conifers are the dominant cover types. Trees generally are not planted on this soil. Clearcutting is common. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is generally unsuited to building site development because of the wetness and the limited depth to bedrock. It is generally unsuited to septic tank absorption fields and sewage lagoons because of the wetness, the limited depth to bedrock, and seepage in the material above the bedrock.

The woodland ordination symbol is 2W, the land capability classification is VIIw, and the Michigan soil management group is Rbc. No habitat type is assigned.

57B—Summerville-Longrie complex, 1 to 6 percent slopes, rocky. This map unit consists of a nearly level and undulating, shallow, well drained Summerville soil and a moderately deep, well drained Longrie soil on the top of ridges and on knolls, benches, and broad plains. Individual areas are irregular in shape and range from 8 to 500 acres in size. They are 30 to 60 percent Summerville soil, 30 to 60 percent Longrie soil, and 1 to 10 percent exposed limestone bedrock. The exposed bedrock occurs as flat areas or as vertical drops of 5 to 15 feet. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Summerville soil has a surface layer of very dark grayish brown loam about 3 inches thick. The subsoil is dark yellowish brown, very friable very fine sandy loam about 10 inches thick. Limestone bedrock is at a depth of about 13 inches.

Typically, the Longrie soil has a surface layer of black sandy loam about 4 inches thick. The subsurface layer is reddish gray sandy loam about 5 inches thick. The subsoil is dark reddish brown and reddish brown, friable fine sandy loam about 18 inches thick. The substratum is light brown gravelly loam about 4 inches thick. It is underlain by limestone bedrock at a depth of about 31 inches. In some places the depth to bedrock is more than 40 inches. In other places the surface layer is fine sandy loam, silt loam, or loam.

Included with these soils in mapping are small areas of the deep, well drained Posen soils. These included soils are in landscape positions similar to those of the Summerville and Longrie soils. Also included are small areas of the somewhat poorly drained Ensign soils in depressions and areas of the stony and bouldery Summerville and Longrie soils. Included soils make up about 5 to 15 percent of the map unit.

Permeability is moderate in the Summerville and Longrie soils. The available water capacity is low in the Summerville soil and moderate in the Longrie soil. Surface runoff is slow on both soils.

Most areas are used as woodland. A few are idle grassland.

The major concerns in managing woodland are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. The bedrock interferes with road construction in a few areas. Trafficability is briefly limited in spring and in other excessively wet periods. When the soils are wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. The northern hardwoods cover type is dominant on these soils. Because of the shallowness to bedrock, trees on these soils are shallow rooted. Some may be blown down during periods of high winds. Species preference can be managed by selective cutting. Selection of special planting stock, such as containerized seedlings, and special site preparation that protects the surface with thin layers of loose slash can reduce the seedling mortality rate. Furrowing before planting also can increase the seedling survival rate. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

The Longrie soil is fairly well suited to buildings without basements but is poorly suited to buildings with basements. The limited depth to bedrock is the main limitation. The Summerville soil is generally unsuited to building site development because of the limited depth to bedrock. Both soils are generally unsuited to septic tank absorption fields and sewage lagoons because of the limited depth to bedrock and seepage.

The woodland ordination symbol is 2D, the land capability classification is IIIs, and the Michigan soil management groups are Ra and 3/Ra. No habitat type is assigned.

61A—Halfaday sand, 0 to 3 percent slopes. This very deep, moderately well drained, nearly level soil is on broad plains, low ridges, and knolls. Individual areas are irregular in shape and range from 5 to more than 200 acres in size.

Typically, the surface is covered by about 1 inch of partially decomposed leaf litter. The surface layer is black sand about 1 inch thick. The subsurface layer is brown sand about 6 inches thick. The subsoil is sand about 30 inches thick. The upper part is dark reddish brown, dark brown, and strong brown and is very friable. The next part is dark brown and brownish yellow, mottled, and very friable. The lower part is yellowish brown, mottled, and loose. The substratum to a depth of about 60 inches is brownish yellow, mottled sand. In places the soil is mottled below a depth of 60 inches.

Included with this soil in mapping are small areas of the well drained Manistee and somewhat poorly drained Au Gres soils. Manistee soils have a clayey substratum. They are in landscape positions similar to or slightly higher than those of the Halfaday soil. Au Gres soils are in depressions. Included soils make up about 5 to 10 percent of the map unit.

Permeability is rapid in the Halfaday soil. The available water capacity is low. Surface runoff is slow. The seasonal high water table is at a depth of 2 to 3 feet from late fall to late spring.

Most areas are used as woodland. The major management concerns are the equipment limitation and plant competition. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. Northern hardwoods and red pine are the dominant cover types on this soil. Species preference can be managed by selective cutting. Some areas are clearcut. If seedlings are planted, site preparation by mechanical or chemical means generally is needed to control plant competition.

This soil is fairly well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management needs are measures that conserve moisture, help to control soil blowing, and maintain the organic matter content. Examples are buffer strips, vegetative field barriers, additions of organic material, and a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface.

This soil is well suited to pasture. Overgrazing during dry periods can destroy the plant cover. The major management concern is droughtiness. Proper stocking rates, rotation grazing, strip grazing, and restricted use during dry periods help to keep the pasture in good condition.

This soil is fairly well suited to building site development, but wetness is a limitation on sites for buildings with basements. Buildings with basements can be constructed on well compacted fill material, which raises the level of the site. A drainage system helps to lower the water table. The soil is poorly suited to septic tank absorption fields because of the high water table and a poor filtering capacity. It is generally unsuited to sewage lagoons because of seepage and the high water table. If a septic tank absorption field is used, filling or mounding is needed to raise the site above the seasonal high water table. The soil readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water.

The woodland ordination symbol is 3S, the land capability classification is IIIs, and the Michigan soil management group is 5a. The primary habitat type is ATD, and the secondary habitat type is TMC-D.

67B—Duel-Rock outcrop complex, 1 to 6 percent slopes. This map unit consists of a moderately deep, nearly level and undulating, well drained Duel soil and exposed limestone bedrock on benches, ridges, and broad upland flats. The Rock outcrop occurs as flat areas or vertical drops of 5 to 15 feet. Individual areas of this unit are irregular in shape and range from 5 to 100 acres in size. They are 60 to 80 percent Duel soil and 10 to 35 percent Rock outcrop. The Duel soil and Rock outcrop occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Duel soil has a surface layer of black sand about 3 inches thick. The subsurface layer is brown loamy sand about 6 inches thick. The subsoil is about 21 inches of dark reddish brown and dark brown loose loamy sand and loamy coarse sand. The substratum is pale brown very gravelly very fine sandy loam about 8 inches thick. Limestone bedrock is at a depth of about 38 inches. In places the depth to bedrock is more than 40 inches.

Included with this unit in mapping are small areas of the deep, somewhat excessively drained Kalkaska and moderately deep, well drained Longrie soils. These soils are in landscape positions similar to those of the Duel soil. Longrie soils are loamy and are underlain by limestone bedrock. Included soils make up about 5 to 15 percent of the map unit.

Permeability is moderate to rapid in the Duel soil. The available water capacity is low. Surface runoff is slow.

This soil is used as woodland. The major management concerns are the equipment limitation and seedling mortality. The bedrock interferes with road construction and the use of equipment in some areas. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. Northern hardwoods and aspen are the dominant cover types. Clearcutting is common. If seedlings are planted, site preparation by mechanical or chemical means is needed to control plant competition.

This soil is fairly well suited to buildings without basements but is poorly suited to buildings with basements. The depth to bedrock is the main limitation. The soil is poorly suited to septic tank absorption fields because of the depth to bedrock and a poor filtering capacity. It is generally unsuited to sewage lagoons because of the depth to bedrock and seepage. Buildings with basements can be constructed on well compacted fill material, which raises the level of the site. The soil readily absorbs but does not adequately filter the effluent in septic tank absorption fields. The poor filtering capacity can result in the pollution of ground water.

The woodland ordination symbol assigned to the

Duel soil is 2D, the land capability classification is IVs, and the Michigan soil management group is 4/Ra. The primary habitat type is TM.

68—Pinconning mucky loamy sand. This very deep, poorly drained, nearly level soil is in depressions and on low, broad plains. It is frequently ponded. Individual areas are irregular in shape and range from 5 to more than 500 acres in size.

Typically, the surface layer is black mucky loamy sand about 8 inches thick. The substratum is mottled. The upper part is yellowish brown and grayish brown sand about 13 inches thick, and the lower part of the substratum to a depth of about 60 inches is reddish gray and reddish brown silty clay and clay.

Included with this soil in mapping are small areas of the poorly drained Roscommon and Pickford and somewhat poorly drained Allendale soils. Roscommon and Pickford soils are in landscape positions similar to those of the Pinconning soil. Roscommon soils have a sandy substratum. Pickford soils are clayey throughout. Allendale soils are on low knolls. Included soils make up about 5 to 15 percent of the map unit.

Permeability is rapid in the upper part of the Pinconning soil and slow or very slow in the lower part. The available water capacity is low. Surface runoff is very slow or ponded. The seasonal high water table is 1 foot above to 1 foot below the surface from fall to early spring.

This soil is used as woodland. Some areas support lowland brush.

The major concerns in managing woodland are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the high water table, the use of equipment is restricted to dry summer months or to winter months when the snow cover is adequate. Year-round logging roads require fill and a gravel base. Culverts are needed to maintain the natural drainage system. The number of suitable landing sites is severely limited because of the wetness. Because of the high water table, trees on this soil are shallow rooted. Many may be blown down during periods of high winds. The swamp conifer cover type is dominant on this soil. After the trees are cut, competition from wetland brush can delay or prevent natural regeneration. The wetness can result in the loss of seedlings. Trees generally are not planted on this soil because of the wetness, severe seedling mortality, severe plant competition, and low productivity.

This soil generally is unsuitable as a site for buildings because of the ponding. It is generally unsuited to septic tank absorption fields because of the ponding, seepage in the sandy material, and the very slow permeability in the clayey material. The soil is generally unsuited to sewage lagoons because of the ponding and the seepage.

The woodland ordination symbol is 3W, the land capability classification is Vw, and the Michigan soil management group is 4/1c. No habitat type is assigned.

78B—Waiska sandy loam, 0 to 6 percent slopes. This very deep, excessively drained, nearly level and undulating soil is on glacial lake benches, stream terraces, and outwash plains. Individual areas are irregularly shaped or elongated and range from 5 to 100 acres in size.

Typically, the surface is covered with partially decomposed leaf litter about 1 inch thick. The surface layer is reddish gray sandy loam about 2 inches thick. The subsoil is about 29 inches thick. The upper part is dark reddish brown and dark brown, very friable gravelly sandy loam; the next part is dark brown, loose very gravelly loamy coarse sand; and the lower part is strong brown, loose very gravelly coarse sand. The substratum to a depth of about 60 inches is dark yellowish brown and yellowish brown very gravelly coarse sand. In places the surface layer is sand, loamy sand, loam, the gravelly or very gravelly analogs of those textures, or gravelly or very gravelly sandy loam.

Included with this soil in mapping are small areas of the somewhat excessively drained Kalkaska and moderately well drained Ocqueoc soils. These soils are in landscape positions similar to those of the Waiska soil. Kalkaska soils have a lower content of coarse fragments than the Waiska soil. Ocqueoc soils have a stratified, sandy and loamy substratum. Included soils make up about 5 to 15 percent of the map unit.

Permeability is very rapid in the Waiska soil. The available water capacity is low. Surface runoff is slow.

This soil is used as woodland. There are no major management concerns. The northern hardwoods cover type is dominant. Species preference can be managed by selective cutting. Some areas are clearcut. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is well suited to building site development. It is poorly suited to septic tank absorption fields because of a poor filtering capacity. It is generally unsuited to sewage lagoons because of seepage. It readily absorbs but does not adequately filter the effluent in septic tank absorption fields. The poor filtering capacity can result in the pollution of ground water.

The woodland ordination symbol is 3A, the land capability classification is VIs, and the Michigan soil management group is 5a. No habitat type is assigned.

79B—Kalkaska-Manistee sands, 0 to 6 percent slopes. This map unit consists of a very deep, nearly level and undulating, somewhat excessively drained Kalkaska soil and a very deep, moderately well drained Manistee soil. The Kalkaska soil is on ridges and knolls, and the Manistee soil is in the more nearly level areas. Individual areas of this unit are irregular in shape and range from 10 to 250 acres in size. They are 50 to 70 percent Kalkaska soil and 15 to 30 percent Manistee soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Kalkaska soil is covered by about 1 inch of partially decomposed leaf litter. The surface layer is dark reddish brown sand about 2 inches thick. The subsurface layer is reddish brown sand about 5 inches thick. The subsoil is about 24 inches thick. The upper part is dark reddish brown, friable loamy sand, and the lower part is dark brown and strong brown, very friable and loose sand. The substratum to a depth of about 60 inches is yellowish brown sand. In some places the soil has 5 to 15 percent gravel and cobbles on or below the surface. In other places the surface layer is loamy sand.

Typically, the Manistee soil is covered by about 3 inches of well decomposed leaf litter. The surface layer is pinkish gray sand about 9 inches thick. The subsoil is about 26 inches thick. It is firm. The upper part is dark reddish brown sand; the next part is dark brown, mottled sand; and the lower part is reddish brown and pinkish gray, mottled silty clay loam and loamy sand. The substratum to a depth of about 60 inches is reddish brown clay.

Included with these soils in mapping are small areas of the well drained Superior and moderately well drained Alcona and Ocqueoc soils. These included soils are in landscape positions similar to those of the Kalkaska and Manistee soils. Superior soils are loamy in the surface layer and in the upper part of the subsoil. Alcona soils formed in stratified, sandy and loamy deposits. Ocqueoc soils have a stratified, sandy and loamy substratum. Also included are small areas of the somewhat poorly drained Au Gres soils in depressions. Included soils make up about 5 to 15 percent of the map unit.

Permeability is rapid in the Kalkaska soil. It is rapid in the upper part of the Manistee soil and very slow in the lower part. The available water capacity is low in both soils. Surface runoff is slow. The Manistee soil has a perched seasonal high water table at a depth of 2.5 to 4.0 feet from late fall to late spring.

Most areas are used as woodland. The major management concerns are the equipment limitation, seedling mortality, and plant competition. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. The northern hardwoods cover type is dominant on these soils. Species preference can be managed by selective cutting. Some areas are clearcut. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

These soils are poorly suited to cropland, but such crops as oats, barley, wheat, and a mixture of grasses and legumes can be grown. The major management needs are measures that conserve moisture, help to control soil blowing, and maintain the organic matter content. Examples are buffer strips, vegetative barriers, field windbreaks, additions of organic material, and a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface.

These soils are fairly well suited to pasture. Overgrazing during dry periods can destroy the plant cover. Proper stocking rates, rotation grazing, strip grazing, and restricted grazing during dry periods help to keep the pasture in good condition.

The Kalkaska soil is well suited to building site development, and the Manistee soil is fairly well suited. The wetness and the shrink-swell potential of the Manistee soil are limitations on sites for buildings with basements. In areas of the Manistee soil, buildings with basements can be constructed on well compacted fill material, which raises the level of the site. A drainage system helps to lower the water table in the Manistee soil. The soils are poorly suited to septic tank absorption fields because of a poor filtering capacity in the Kalkaska soil and in the upper part of the Manistee soil. The Manistee soil also is limited by wetness and by the very slow permeability in the lower part of the profile. The Kalkaska soil readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. The soils are generally unsuited to sewage lagoons because of seepage.

The woodland ordination symbol is 3S, the land capability classification is IVs, and the Michigan soil management groups are 5a and 4/1a. The primary habitat type is ATD.

79D—Kalkaska-Manistee sands, 6 to 15 percent slopes. This map unit consists of a very deep, gently rolling and rolling, somewhat excessively drained Kalkaska soil and a very deep, well drained Manistee soil. The Kalkaska soil is on ridges and knolls, and the Manistee soil is on side slopes and flats. Individual areas of this unit are elongated or irregularly shaped and range from 10 to 50 acres in size. They are 40 to 60 percent Kalkaska soil and 20 to 40 percent Manistee soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Kalkaska soil is covered by about 1 inch of partially decomposed leaf litter. The surface layer is dark reddish brown sand about 2 inches thick. The subsurface layer is reddish brown sand about 5 inches thick. The subsoil is about 24 inches thick. The upper part is dark reddish brown, friable loamy sand, and the lower part is dark brown and strong brown, very friable and loose sand. The substratum to a depth of about 60 inches is yellowish brown sand. In some places the soil has 5 to 15 percent gravel and cobbles on or below the surface. In other places the surface layer is loamy sand.

Typically, the Manistee soil is covered by about 3 inches of well decomposed leaf litter. The surface layer is pinkish gray sand about 9 inches thick. The subsoil is about 26 inches thick. It is firm. The upper part is dark reddish brown and dark brown sand, and the lower part is reddish brown and pinkish gray silty clay loam and loamy sand. The substratum to a depth of about 60 inches is reddish brown clay.

Included with these soils in mapping are small areas of the well drained Superior, Alcona, and Ocqueoc soils. These included soils are in landscape positions similar to those of the Kalkaska and Manistee soils. Superior soils are loamy in the surface layer and in the upper part of the subsoil. Alcona soils formed in stratified, sandy and loamy deposits. Ocqueoc soils have a stratified, sandy and loamy substratum. Included soils make up about 5 to 15 percent of the map unit.

Permeability is rapid in the Kalkaska soil. It is rapid in the upper part of the Manistee soil and very slow in the lower part. The available water capacity is low in both soils. Surface runoff is slow.

These soils are used as woodland. The major management concerns are the equipment limitation, seedling mortality, and plant competition. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. Logging roads should be stabilized. Landings can be located in the small nearly level areas that may be included in this unit. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. The northern hardwoods cover type is dominant on these soils. Species preference can be managed by selective cutting. Some areas are clearcut. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

These soils are fairly well suited to building site development. The slope is the main limitation. The Kalkaska soil is poorly suited to septic tank absorption fields because of a poor filtering capacity and the slope, and the Manistee soil is poorly suited because of a poor filtering capacity in the upper part of the profile, the very slow permeability in the lower part, and the slope. The soils are generally unsuited to sewage lagoons because of seepage and the slope. Buildings should be designed so that they conform to the natural slope of the land. The soils readily absorb but do not adequately filter the effluent in septic tank absorption fields. The poor filtering capacity can result in the pollution of ground water. Land shaping and installing the distribution lines across the slope generally help to ensure that the absorption field functions properly.

The woodland ordination symbol is 3S, the land capability classification is VIs, and the Michigan soil management groups are 5a and 4/1a. The primary habitat type is ATD.

80B—Superior fine sandy loam, 1 to 6 percent slopes. This very deep, well drained, nearly level and undulating soil is on the tops of ridges and broad flats. Individual areas are irregular in shape and range from 5 to 400 acres in size.

Typically, the surface is covered by undecomposed leaf litter about 2 inches thick. The surface layer is pinkish gray fine sandy loam about 2 inches thick. The subsoil is about 34 inches thick. In sequence downward, it is dark reddish brown and brown, very friable fine sandy loam; brown and reddish brown, friable fine sandy loam and clay loam; reddish brown and light reddish brown, firm silty clay and fine sandy loam; and reddish brown, very firm clay. The substratum to a depth of about 60 inches is reddish brown clay. In some places the surface layer is sandy loam or loam. In other places the upper part of the subsoil is finer textured.

Included with this soil in mapping are small areas of the somewhat excessively drained Kalkaska, moderately well drained Manistee and Ocqueoc, and somewhat poorly drained Allendale soils. Kalkaska soils are sandy throughout. They are in landscape positions similar to or slightly higher than those of the Superior soil. Manistee and Allendale soils are sandy in the surface layer and in the upper part of the subsoil. Ocqueoc soils are sandy in the upper part of the profile and have a stratified, sandy and loamy substratum. Manistee and Ocqueoc soils are in landscape positions similar to those of the Superior soil. Allendale soils are in depressions. Included soils make up about 5 to 15 percent of the map unit.

Permeability is moderately rapid in the upper part of the Superior soil and very slow in the lower part. The available water capacity is moderate. Surface runoff is slow. The shrink-swell potential is high.

This soil is used as woodland. The major management concerns are the equipment limitation, the windthrow hazard, and plant competition. Trafficability is briefly limited in spring and in other excessively wet periods. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. Because of the firm subsoil, trees on this soil are shallow rooted. Some may be blown down during periods of high winds. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management concern is controlling water erosion. Cover crops, close-growing crops, grassed waterways, and a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface help to control water erosion. When the soil is wet, ruts form easily and the load-bearing capacity is low.

This soil is well suited to pasture. Maintaining an adequate vegetative cover by preventing overgrazing helps to control surface runoff and erosion.

This soil is poorly suited to building site development because of the shrink-swell potential. It is generally unsuited to septic tank absorption fields because of the very slow permeability. It is poorly suited to sewage lagoons because of seepage. Lagoon sites may require some leveling and banking. Sealing the lagoon helps to prevent seepage. On sites for buildings, the foundation trench should be widened and backfilled with suitable coarse textured material.

The woodland ordination symbol is 6D, the land capability classification is IIe, and the Michigan soil management group is 1a. No habitat type is assigned.

83A—Allendale-Croswell complex, 0 to 3 percent slopes. This map unit consists of a very deep, nearly level, somewhat poorly drained Allendale soil in depressions and a very deep, moderately well drained Croswell soil on low knolls and ridges. Individual areas are irregular in shape and range from 10 to 100 acres in size. They are 40 to 60 percent Allendale soil and 30 to 50 percent Croswell soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Allendale soil has a surface layer of black loamy fine sand about 5 inches thick. The subsurface layer is pinkish gray fine sand about 3 inches thick. The subsoil is about 27 inches thick. The upper part is dark reddish brown, very friable loamy fine sand; the next part is strong brown and yellowish brown, mottled, very friable fine sand; and the lower part is reddish brown, mottled, firm silty clay. The substratum to a depth of about 60 inches is light reddish brown, mottled silty clay that has thin strata of yellowish brown silt loam and silty clay loam. In places the surface layer is fine sand or loamy sand.

Typically, the Croswell soil is covered by about 2 inches of black, partially decomposed leaf litter. The surface layer is brown sand about 2 inches thick. The subsoil is strong brown and yellowish brown, very friable and friable sand about 27 inches thick. The substratum to a depth of about 60 inches is light yellowish brown and brownish yellow, mottled sand. In places part or all of the soil is fine sand.

Included with these soils in mapping are small areas of the somewhat poorly drained Au Gres, poorly drained Fibre, and somewhat excessively drained Kalkaska soils. Au Gres soils are sandy throughout. They are in landscape positions similar to those of the Allendale soil. Fibre soils formed in sandy material underlain by clay. They are in depressions and drainageways. Kalkaska soils are on ridges and knolls. Included soils make up about 5 to 20 percent of the map unit.

Permeability is moderately rapid and rapid in the upper part of the Allendale soil and very slow in the clayey lower part. It is rapid in the Croswell soil. The available water capacity is moderate in the Allendale soil and low in the Croswell soil. Surface runoff is slow on both soils. From late fall to late spring, the Allendale soil has a seasonal high water table at a depth of 1 to 2 feet and the Croswell soil has one at a depth of 2 to 4 feet.

Most areas are used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the high water table, the use of equipment is restricted to dry summer months or to winter months when the snow cover is adequate. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. The best sites for landings are the low ridges. Year-round logging roads in the lower areas should be graveled. Culverts are needed to maintain the natural drainage system. Because of the high water table, trees in the lower areas are shallow rooted. Some may be blown down during periods of high winds. The aspen cover type is dominant on these soils. The mortality of planted seedlings can be expected during dry periods. Selection of special planting stock, such as containerized seedlings, and special site preparation that protects the surface with thin layers of loose slash can reduce the seedling mortality rate. Furrowing before planting also can increase the seedling survival rate. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

These soils are fairly well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management needs are measures that remove excess water during wet periods, conserve moisture during dry periods, and help to control soil blowing. A subsurface drainage system can help to lower the water table. Conservation tillage, additions of organic material, buffer strips, vegetative barriers, field windbreaks, and small grain crops can conserve moisture and help to control soil blowing.

These soils are well suited to pasture. The forage species that are tolerant of wetness should be selected for planting. Proper stocking rates and rotation grazing are needed.

The Allendale soil is poorly suited to building site development because of the wetness. The Croswell soil is fairly well suited to buildings without basements, but it is poorly suited to buildings with basements because of the wetness. In areas of the Croswell soil, buildings with basements can be constructed on well compacted fill material, which raises the level of the site. A drainage system helps to lower the water table in these soils. The Allendale soil is generally unsuited to septic tank absorption fields because of the wetness, a poor filtering capacity in the sandy upper part of the profile, and the very slow permeability in the clayey lower part. The Croswell soil is poorly suited to septic tank absorption fields because of the high water table and a poor filtering capacity. If a septic tank disposal system is installed, filling or mounding with suitable material can raise the site above the seasonal high water table. The soils readily absorb but do not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. The soils are generally unsuited to sewage lagoons because of the wetness and seepage.

The woodland ordination symbols are 4W and 5S, the land capability classification is IIIw, and the Michigan soil management groups are 4/1b and 5.3a. The primary habitat type is TMC-D, and the secondary habitat type is TM.

84B—Rousseau, dark subsoil-Alcona complex, 0 to 6 percent slopes. These very deep, nearly level and undulating, well drained soils are on broad plains and upland flats. Individual areas are irregular in shape and range from 10 to 600 acres in size. They are 50 to 70 percent Rousseau soil and 20 to 40 percent Alcona soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Rousseau soil has a surface layer of black fine sand about 2 inches thick. The subsurface layer is reddish gray fine sand about 3 inches thick. The subsoil is dark reddish brown and strong brown, very friable fine sand about 15 inches thick. The substratum to a depth of about 60 inches is light brown and brown fine sand. In places the soil is mottled in the lower part of the substratum.

Typically, the Alcona soil is covered by about 1 inch of undecomposed hardwood leaf litter. The surface layer is brown loamy very fine sand about 3 inches thick. The subsoil is about 52 inches thick. The upper part is dark reddish brown, yellowish brown, and brownish yellow, very friable very fine sandy loam and loamy very fine sand, and the lower part is light yellowish brown to strong brown, mottled, very friable loamy very fine sand and very fine sandy loam. The substratum to a depth of about 60 inches is yellowish brown and strong brown, mottled, stratified silt, silt loam, very fine sand, and loamy very fine sand. It has thin bands of silty clay loam.

Included with these soils in mapping are small areas of the moderately well drained Ocqueoc and somewhat poorly drained Wainola soils. Ocqueoc soils have a sandy surface layer and subsoil and a stratified, sandy and loamy substratum. They are in landscape positions similar to those of the Rousseau and Alcona soils. Wainola soils formed in deep deposits of sandy material. They are in the slightly lower landscape positions. Included soils make up about 5 to 20 percent of the map unit.

Permeability is rapid in the Rousseau soil and moderate in the Alcona soil. The available water capacity is low in the Rousseau soil and moderate in the Alcona soil. Surface runoff is slow on both soils. The Alcona soil has a perched seasonal high water table at a depth of 2.5 to 6.0 feet from late fall to late spring.

Most areas are used as woodland. The major management concerns are the equipment limitation, seedling mortality, and plant competition. In the sandy areas, loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. In the loamy areas, trafficability may be briefly limited in spring and in other excessively wet periods. When the soils are wet, unsurfaced logging roads are slippery and ruts form easily. Deep ruts tend to restrict lateral drainage, expose tree roots, and alter soil structure. Year-round logging roads should be graveled. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the sandy surface layer and the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. The northern hardwoods cover type is dominant on these soils. Species preference can be managed by selective cutting. Some areas are clearcut. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

These soils are fairly well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management needs are measures that conserve moisture, help to control soil blowing, and control water erosion. Examples are buffer strips, vegetative barriers, field windbreaks, and a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface.

These soils are well suited to pasture. Overgrazing during dry periods can destroy the plant cover and increase the susceptibility to erosion. Proper stocking rates, rotation grazing, strip grazing, and restricted use during dry periods help to keep the pasture in good condition and prevent excessive erosion.

The Rousseau soil is well suited to building site development. The Alcona soil is well suited to buildings without basements and fairly well suited to buildings with basements. The wetness is a limitation. In areas of the Alcona soil, buildings with basements can be constructed on well compacted fill material, which raises the level of the site above the water table. A drainage system helps to lower the water table. The soils are poorly suited to septic tank absorption fields because of a poor filtering capacity in the Rousseau soil and the wetness in the Alcona soil. The Rousseau soil readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. If a septic tank disposal system is installed in areas of the Alcona soil, filling or mounding with suitable material can raise the site above the seasonal high water table. The soils are generally unsuited to sewage lagoons because of seepage.

The woodland ordination symbols are 3S and 3L, the land capability classification is IIIs, and the Michigan soil management groups are 5a and 3a-s. The primary habitat type is ATD.

84D—Rousseau, dark subsoil-Alcona complex, 6 to 15 percent slopes. This map unit consists of very deep, gently rolling to rolling, well drained Rousseau and moderately well drained Alcona soils on the sides of ridges and knolls. Individual areas are irregular in shape and range from 10 to more than 200 acres in size. They are about 50 to 70 percent Rousseau soil and 20 to 40 percent Alcona soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Rousseau soil has a surface layer of black fine sand about 2 inches thick. The subsurface layer is reddish gray fine sand about 3 inches thick. The subsoil is dark reddish brown and strong brown, very friable fine sand about 15 inches thick. The substratum to a depth of about 60 inches is light brown and brown fine sand.

Typically, the Alcona soil is covered by about 1 inch of undecomposed hardwood leaf litter. The surface layer is brown loamy very fine sand about 3 inches thick. The subsoil is 52 inches thick. The upper part is dark reddish brown, yellowish brown, and brownish yellow, very friable very fine sandy loam and loamy very fine sand, and the lower part is light yellowish brown to strong brown, mottled, very friable loamy very fine sand and very fine sandy loam. The substratum to a depth of about 60 inches is yellowish brown and strong brown, mottled, stratified silt, silt loam, very fine sand, and loamy very fine sand. It has thin bands of silty clay loam.

Included with these soils in mapping are small areas of the moderately well drained Halfaday and Ontonagon soils. These included soils are in landscape positions similar to those of the Rousseau and Alcona soils. Halfaday soils are sand throughout. Ontonagon soils are clayey throughout. Included soils make up about 5 to 20 percent of the map unit.

Permeability is rapid in the Rousseau soil and moderate in the Alcona soil. The available water capacity is low in the Rousseau soil and moderate in the Alcona soil. Surface runoff is slow on both soils. The Alcona soil has a perched seasonal high water table at a depth of 2.5 to 6.0 feet from late fall to late spring.

These soils are used as woodland. The major management concerns are the equipment limitation, seedling mortality, and plant competition. In the sandy areas, loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. In the loamy areas, trafficability may be briefly limited in spring and in other excessively wet periods. When the soils are wet, unsurfaced logging roads are slippery and ruts form easily. Deep ruts tend to restrict lateral drainage, expose tree roots, and alter soil structure. Year-round logging roads should be graveled. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the sandy surface layer and the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. The northern hardwoods cover type is dominant on these soils. Species preference can be managed by selective cutting. Some areas are clearcut. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

These soils are fairly well suited to building site development. The wetness in areas of the Alcona soil and the slope are the main limitations. The buildings should be designed so that they conform to the natural slope of the land. In areas of the Alcona soil, buildings with basements can be constructed on well compacted fill material, which raises the level of the site above the water table. A drainage system helps to lower the water table in the Alcona soil. The soils are poorly suited to septic tank absorption fields because of a poor filtering capacity in the Rousseau soil and the high water table in the Alcona soil. The Rousseau soil readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. If a septic tank disposal system is installed in areas of the Alcona soil, filling or mounding with suitable material can raise the site above the seasonal high water table. The soils are generally unsuitable as sites for sewage lagoons because of seepage, the wetness, and the slope.

The woodland ordination symbols are 3S and 3L, the land capability classification is IIIe, and the Michigan soil management groups are 5a and 3a-s. The primary habitat type is ATD.

84F—Rousseau, dark subsoil-Alcona complex, 25 to 50 percent slopes. These very deep, well drained, steep and very steep soils are on the sides of ridges and knolls. Individual areas are irregular in shape and range from 10 to more than 150 acres in size. They are 50 to 70 percent Rousseau soil and 20 to 40 percent Alcona soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Rousseau soil has a surface layer of black fine sand about 2 inches thick. The subsurface layer is reddish gray fine sand about 3 inches thick. The subsoil is dark reddish brown and strong brown, very friable fine sand about 15 inches thick. The substratum to a depth of about 60 inches is light brown and brown fine sand.

Typically, the Alcona soil is covered by about 1 inch of undecomposed hardwood leaf litter. The surface layer is brown loamy very fine sand about 3 inches thick. The subsoil is about 52 inches of dark reddish brown, yellowish brown, and brownish yellow, very friable very fine sandy loam and loamy very fine sand. The substratum to a depth of about 60 inches is yellowish brown and strong brown, stratified silt, silt loam, very fine sand, and loamy very fine sand. It has thin bands of silty clay loam.

Included with these soils in mapping are small areas of the well drained Ontonagon soils. These included soils are in landscape positions similar to those of the Rousseau and Alcona soils. They are clayey throughout. They make up about 5 to 20 percent of the map unit.

Permeability is rapid in the Rousseau soil and moderate in the Alcona soil. The available water capacity is low in the Rousseau soil and moderate in the Alcona soil. Surface runoff is medium on both soils.

These soils are used as woodland. The major management concerns are the equipment limitation, the erosion hazard, seedling mortality, and plant competition. Access is limited by the slope. Special care is needed in laying out logging roads and in operating equipment. The roads can be designed so that they conform to the natural slope of the land. Special logging methods, such as yarding with a cable, may be needed to minimize surface disturbance. In the sandy areas, loose sand and the slope can interfere with the traction of wheeled equipment. Removing water with water bars, out-sloping road surfaces, culverts, and drop structures minimizes erosion. Landings should be located on the less sloping nearby soils. Seedling mortality can be a problem during dry periods because of the low available water capacity, especially on south aspects. Site preparation and planting are severely limited by the slope. The northern hardwoods cover type is dominant on these soils. Species preference can be managed by selective cutting.

These soils are generally unsuited to building site development and sanitary facilities because of the slope.

The woodland ordination symbol is 3R, the land capability classification is VIe, and the Michigan soil management groups are 5a and 3a-s. The primary habitat type is ATD.

85B—Kalkaska-Ocqueoc complex, 0 to 6 percent slopes. This map unit consists of very deep, nearly level and undulating, somewhat excessively drained Kalkaska and moderately well drained Ocqueoc soils on broad plains and upland flats. Individual areas are irregular in shape and range from 10 to 500 acres in size. They are 50 to 70 percent Kalkaska soil and 20 to 40 percent Ocqueoc soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Kalkaska soil is covered by about 1 inch of partially decomposed leaf litter. The surface layer is dark reddish brown sand about 2 inches thick. The subsurface layer is reddish brown sand about 5 inches thick. The subsoil is about 24 inches thick. The upper part is dark reddish brown, friable loamy sand, and the lower part is dark brown and strong brown, very friable and loose sand. The substratum to a depth of about 60 inches is yellowish brown sand. In some places it is mottled. In other places the surface layer is loamy sand.

Typically, the Ocqueoc soil is covered by about 2 inches of well decomposed leaf litter. The surface layer is pinkish gray fine sand about 8 inches thick. The subsoil is about 14 inches thick. The upper part is dark reddish brown, dark brown, and brown, very friable and loose fine sand, and the lower part is dark yellowish brown, very friable loamy fine sand. The substratum to a depth of about 60 inches is brown and yellowish brown, mottled, stratified fine sand to silt loam.

Included with these soils in mapping are small areas of the moderately well drained Alcona soils. These included soils are in landscape positions similar to those of the Kalkaska and Ocqueoc soils. They have a loamy surface layer. They make up about 5 to 10 percent of the map unit.

Permeability is rapid in the Kalkaska soil. It is rapid in the sandy upper part of the Ocqueoc soil and moderately slow in the lower part. The available water capacity is low in the Kalkaska soil and moderate in the Ocqueoc soil. Surface runoff is slow on both soils. The Ocqueoc soil has a seasonal high water table at a depth of 2.5 to 6.0 feet from late fall to late spring.

Most areas are used as woodland. The major management concerns are the equipment limitation, seedling mortality, and plant competition. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. The northern hardwoods cover type is dominant on these soils. Species preference can be managed by selective cutting. Some areas are clearcut. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

These soils are poorly suited to cropland, but such crops as oats, barley, wheat, and a mixture of grasses and legumes can be grown. The major management needs are measures that conserve moisture, maintain the organic matter content, and help to control soil blowing. Examples are buffer strips, vegetative barriers, field windbreaks, small grain crops, additions of organic material, and a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface.

These soils are fairly well suited to pasture. Overgrazing during dry periods can destroy the plant cover. Proper stocking rates, rotation grazing, strip grazing, and restricted use during dry periods help to keep the pasture in good condition.

The Kalkaska soil is well suited to building site development. The Ocqueoc soil is well suited to buildings without basements and fairly well suited to buildings with basements. The wetness and the shrink-swell potential are limitations. In areas of the Ocqueoc soil, buildings with basements can be constructed on well compacted fill material, which raises the level of the site. A drainage system helps to lower the water table in the Ocqueoc soil. The soils are poorly suited to septic tank absorption fields because of a poor filtering capacity in the upper part of the Ocqueoc soil and in the Kalkaska soil. The Ocqueoc soil also is limited by wetness and by the moderately slow permeability in the lower part of the profile. The Kalkaska soil readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. The soils are generally unsuited to sewage lagoons because of seepage.

The woodland ordination symbol is 3S, the land capability classification is IVs, and the Michigan soil management groups are 5a and 4/2a. The primary habitat type is ATD.

86A—Ingalls-Halfaday complex, 0 to 3 percent slopes. This map unit consists of a very deep, nearly level, somewhat poorly drained Ingalls soil and a very deep, nearly level, moderately well drained Halfaday soil. The Ingalls soil is in depressions and drainageways and on small flats. The Halfaday soil is on low ridges and knolls. Individual areas of this unit are irregular in shape and range from 5 to 100 acres in size. They are 40 to 55 percent Ingalls soil and 35 to 45 percent Halfaday soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Ingalls soil is covered by about 3 inches of leaf litter. The surface layer is brown loamy sand about 7 inches thick. The subsoil is about 33 inches thick. It is mottled. The upper part is dark brown, friable loamy sand and sand. The lower part is brown, very friable loamy fine sand. The substratum to a depth of about 60 inches is dark yellowish brown and brown, mottled, stratified loamy fine sand and silt loam.

Typically, the Halfaday soil is covered by about 1 inch of partially decomposed leaf litter. The surface layer is black sand about 1 inch thick. The subsurface layer is brown sand about 6 inches thick. The subsoil is sand about 30 inches thick. The upper part is dark reddish brown, dark brown, and strong brown and is very friable. The next part is dark brown and brownish yellow, mottled, and very friable. The lower part is yellowish brown, mottled, and loose. The substratum to a depth of about 60 inches is brownish yellow, mottled sand.

Included with these soils in mapping are small areas of the somewhat poorly drained Au Gres and poorly drained Kinross soils. Au Gres and Kinross soils are sandy throughout. Au Gres soils are in landscape positions similar to those of the Ingalls soil. Kinross soils are in depressions and along drainageways. Included soils make up about 5 to 15 percent of the map unit.

Permeability is rapid in the upper part of the Ingalls soil and moderately slow in the loamy lower part. It is rapid in the Halfaday soil. The available water capacity is moderate in the Ingalls soil and low in the Halfaday soil. Surface runoff is slow on both soils. From late fall to late spring, the Ingalls soil has a seasonal high water table at a depth of 0.5 foot to 1.5 feet and the Halfaday soil has one at a depth of 2 to 3 feet.

These soils are used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the high water table, the use of equipment is restricted to dry summer months or to winter months when the snow cover is adequate. Landings can be located in the drier areas of the map unit. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. In some areas seedling mortality can be a problem because of the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. Because of the high water table, trees in some areas of this soil are shallow rooted. Some may be blown down during periods of high winds. The aspen cover type is dominant on these soils. Clearcutting is common. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

These soils are fairly well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management needs are measures that remove excess water during wet periods, conserve moisture during dry periods, and help to control soil blowing. A subsurface drainage system can help to lower the water table. Conservation tillage, additions of organic material, buffer strips, vegetative barriers, field windbreaks, and small grain crops conserve moisture and help to control soil blowing.

These soils are fairly well suited to pasture. The forage species that are tolerant of wetness should be selected for planting. Proper stocking rates and rotation grazing are needed.

Because of the wetness, the Halfaday soil is only fairly well suited to buildings without basements and is poorly suited to buildings with basements. The Ingalls soil is poorly suited to building site development because of the wetness. It is generally unsuited to septic tank absorption fields because of the wetness, the moderately slow permeability in the lower part of the profile, and a poor filtering capacity in the upper part. Buildings with basements can be constructed on well compacted fill material, which raises the level of the site. A drainage system helps to lower the water table. The Halfaday soil is poorly suited to septic tank absorption fields because of the wetness and a poor filtering capacity. It readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. If a septic tank disposal system is installed, filling or mounding the absorption field with suitable material can raise the site above the seasonal high water table. The soils are generally unsuited to sewage lagoons because of the wetness and seepage.

The woodland ordination symbols are 4W and 3S, the land capability classification is IIIw, and the Michigan soil management groups are 4/2b and 5a. No habitat type is assigned.

87B—Rousseau fine sand, moderately wet, 0 to 6 percent slopes. This very deep, moderately well drained, nearly level and undulating soil is on upland flats. Individual areas are irregular in shape and range from 5 to 200 acres in size.

Typically, the surface layer is very dark grayish brown fine sand about 1 inch thick. The subsurface layer is pinkish gray fine sand about 2 inches thick. The subsoil is dark brown and dark yellowish brown, very friable fine sand about 22 inches thick. The substratum to a depth of about 60 inches is light brown, mottled fine sand. In places the soil has loamy bands below a depth of 40 inches.

Included with this soil in mapping are small areas of the moderately well drained Alcona soils on the higher knobs. These soils are finer textured throughout than the Rousseau soil. Also included are areas of the somewhat poorly drained Wainola soils in depressions. Included soils make up about 5 to 15 percent of the map unit.

Permeability is rapid in the Rousseau soil. The available water capacity is low. Surface runoff is slow. The seasonal high water table is at a depth of 2.5 to 6.5 feet from late fall to late spring.

Most areas are used as woodland. The major management concerns are the equipment limitation and seedling mortality. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. Northern hardwoods and red pine are the dominant cover types. Species preference can be managed by selective cutting. Some areas are clearcut. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is fairly well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management needs are measures that conserve moisture, maintain the organic matter content, and help to control soil blowing. Examples are buffer strips, vegetative barriers, field windbreaks, small grain crops, additions of organic material, and a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface.

This soil is well suited to pasture. Overgrazing during dry periods can destroy the plant cover. Proper stocking rates, rotation grazing, strip grazing, and restricted use during dry periods help to keep the pasture in good condition.

This soil is well suited to dwellings without basements and is fairly well suited to buildings with basements. The wetness is the main limitation. Buildings with basements can be constructed on well compacted fill material, which raises the level of the site above the water table. A drainage system helps to lower the water table. The soil is poorly suited to septic tank absorption fields because of the high water table and a poor filtering capacity. If a septic tank disposal system is installed, filling or mounding with suitable material can raise the site above the seasonal high water table. The soil readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. The soil is generally unsuited to sewage lagoons because of seepage.

The woodland ordination symbol is 5S, the land capability classification is IIIs, and the Michigan soil management group is 4a. No habitat type is assigned.

88A—Croswell-Au Gres sands, 0 to 3 percent slopes. This map unit consists of very deep, nearly level, moderately well drained Croswell and somewhat poorly drained Au Gres soils on low ridges and small flats and in swales. Individual areas are irregular in shape and range from 10 to 300 acres in size. They are 40 to 60 percent Croswell soil and 25 to 45 percent Au Gres soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Croswell soil is covered by about 2 inches of black, partially decomposed leaf litter. The surface layer is brown sand about 2 inches thick. The subsoil is strong brown and yellowish brown, very friable and friable sand about 27 inches thick. The substratum to a depth of about 60 inches is light yellowish brown and brownish yellow, mottled sand.

Typically, the Au Gres soil is covered by about 1 inch of well decomposed leaf litter. The surface layer is black sand about 1 inch thick. The subsurface layer is pinkish gray sand about 4 inches thick. The subsoil is mottled sand about 19 inches thick. The upper part is yellowish red and very friable, and the lower part is strong brown and loose. The substratum to a depth of about 60 inches is brownish yellow and light yellowish brown, mottled sand.

Included with these soils in mapping are small areas of the excessively drained Rubicon and somewhat excessively drained Kalkaska soils on low ridges and knolls. Also included are small areas of the poorly drained Kinross soils in depressions. Included soils make up about 10 to 15 percent of the map unit.

Permeability is rapid in the Croswell and Au Gres soils, and the available water capacity is low. Surface runoff is slow. From late fall to late spring, the Croswell soil has a seasonal high water table at a depth of 2 to 4 feet and the Au Gres soil has one at a depth of 0.5 foot to 1.5 feet.

These soils are used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the high water table, the use of equipment is restricted to dry summer months or to winter months when the snow cover is adequate. Landings can be located on the drier ridges. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. Year-round logging roads should be built in the drier areas. They require a gravel base. Culverts are needed to maintain the natural drainage system. In some areas seedling mortality can be a problem because of the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. Because of the high water table, trees in the lower areas are shallow rooted. Some may be blown down during periods of high winds. The aspen cover type is dominant on these soils. Clearcutting is common. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

These soils are poorly suited to cropland, but such crops as oats, barley, wheat, and a mixture of grasses and legumes can be grown. The major management needs are measures that conserve moisture, maintain the organic matter content, and help to control soil blowing. Examples are buffer strips, vegetative barriers, field windbreaks, small grain crops, additions of organic material, and a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface. A subsurface drainage system in the lower areas is needed, especially during wet periods.

These soils are fairly well suited to pasture. Overgrazing during dry periods can destroy the plant cover. Proper stocking rates, rotation grazing, strip grazing, and restricted use during dry periods help to keep the pasture in good condition.

Because of the wetness, the Croswell soil is only fairly well suited to buildings without basements and is poorly suited to buildings with basements. The Au Gres soil is poorly suited to building site development because of the wetness. Buildings with basements can be constructed on well compacted fill material, which raises the level of the site. A drainage system helps to lower the water table. The Croswell soil is poorly suited to septic tank absorption fields because of the wetness and a poor filtering capacity. It readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. Filling or mounding the absorption field with suitable material can raise the site above the seasonal high water table. The Au Gres soil is generally unsuited to septic tank absorption fields because of the wetness, seepage, and a poor filtering capacity. The soils are generally unsuitable as sites for sewage lagoons because of the wetness and seepage.

The woodland ordination symbols are 5S and 6W, the land capability classification is IVs, and the Michigan soil management groups are 5a and 5b. The primary habitat type is TM, and the secondary habitat type is TMC.

89A—Kinross-Au Gres complex, 0 to 3 percent slopes. This map unit consists of very deep, nearly level, poorly drained Kinross and somewhat poorly drained Au Gres soils on low ridges and knolls. The Kinross soil is frequently ponded. Individual areas of this unit are irregular in shape and range from 10 to 350 acres in size. They are 40 to 60 percent Kinross soil and 30 to 50 percent Au Gres soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Kinross soil has a surface layer of black muck about 5 inches thick. The subsurface layer is brown sand about 5 inches thick. The subsoil is dark brown and brown, mottled, very friable and loose sand about 32 inches thick. The substratum to a depth of about 60 inches is grayish brown sand.

Typically, the Au Gres soil is covered by about 1 inch of well decomposed leaf litter. The surface layer is black sand about 1 inch thick. The subsurface layer is pinkish gray sand about 4 inches thick. The subsoil is mottled sand about 19 inches thick. The upper part is yellowish red and very friable, and the lower part is strong brown and loose. The substratum to a depth of about 60 inches is brownish yellow and light yellowish brown, mottled sand.

Included with these soils in mapping are small areas of the very poorly drained Markey and Carbondale soils in depressions and drainageways. These included soils have more than 16 inches of muck on the surface. Also included are small areas of the moderately well drained Halfaday soils on ridges. Included soils make up about 5 to 15 percent of the map unit.

Permeability is rapid in the Kinross and Au Gres soils, and the available water capacity is low. Surface runoff is slow on the Au Gres soil and very slow or ponded on the Kinross soil. From fall to late spring, the Kinross soil has a seasonal high water table 1 foot above to 1 foot below the surface and the Au Gres soil has one at a depth of 0.5 foot to 1.5 feet.

These soils are used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the high water table, the use of equipment is restricted to dry summer months or to winter months when the snow cover is adequate. The number of suitable landing sites is severely limited because of the wetness. Year-round logging roads require fill and a gravel base. Culverts are needed to maintain the natural drainage system. Because of the wetness, trees on these soils are shallow rooted. Many may be blown down during periods of high winds. Aspen and swamp conifers are the dominant cover types on these soils. Clearcutting is common. Trees generally are not planted on these soils. The opportunities for planting are limited because of the wetness, severe seedling mortality, and plant competition. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

These soils are poorly suited to building site development because of the wetness and the ponding. They are generally unsuited to septic tank absorption fields because of the wetness and a poor filtering capacity and to sewage lagoons because of the wetness and seepage.

The woodland ordination symbols are 2W and 6W, the land capability classification is VIw, and the Michigan soil management groups are 5c and 5b. The primary habitat type is TTS, and the secondary habitat type is TMC.

91B—Rousseau fine sand, 0 to 6 percent slopes. This very deep, well drained, nearly level and undulating soil is on ridgetops and upland flats. Individual areas are irregular in shape and range from 5 to 200 acres in size.

Typically, the surface is covered by about 1 inch of well decomposed leaf litter. The surface layer is dark brown fine sand about 1 inch thick. The subsurface layer is brown fine sand about 3 inches thick. The subsoil is fine sand about 22 inches thick. The upper part is dark brown and strong brown and is very friable. The lower part is yellowish brown and is loose. The substratum to a depth of about 60 inches is brownish yellow fine sand. In places the soil is mottled in the lower part of the substratum.

Included with this soil in mapping are small areas of the somewhat poorly drained Wainola soils in depressions. These soils make up about 5 to 10 percent of the map unit.

Permeability is rapid in the Rousseau soil. The available water capacity is low. Surface runoff is slow.

Most areas are used as woodland. The major management concerns are the equipment limitation and seedling mortality. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. Aspen and red pine are the dominant cover types. Species preference can be managed by selective cutting. Clearcutting is common. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is fairly well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management needs are measures that conserve moisture, maintain the organic matter content, and help to control soil blowing. Examples are buffer strips, vegetative barriers, field windbreaks, small grain crops, additions of organic material, and a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface.

This soil is well suited to pasture. Overgrazing during dry periods can destroy the plant cover. Proper stocking rates, rotation grazing, strip grazing, and restricted use during dry periods help to keep the pasture in good condition.

This soil is well suited to building site development. It is poorly suited to septic tank absorption fields because of a poor filtering capacity. It readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. The soil is unsuited to sewage lagoons because of seepage.

The woodland ordination symbol is 5S, the land capability classification is IIIs, and the Michigan soil management group is 4a. The primary habitat type is TM, and the secondary habitat type is TMV.

91D—Rousseau fine sand, 6 to 15 percent slopes. This very deep, gently rolling and rolling soil is on the sides of ridges and knolls. Individual areas are elongated or irregularly shaped and range from 5 to 100 acres in size.

Typically, the surface is covered by about 1 inch of well decomposed leaf litter. The surface layer is dark brown fine sand about 1 inch thick. The subsurface layer is brown fine sand about 3 inches thick. The subsoil is fine sand about 22 inches thick. The upper part is dark brown and strong brown and is very friable. The lower part is yellowish brown and is loose. The substratum to a depth of about 60 inches is brownish yellow fine sand.

Permeability is rapid. The available water capacity is low. Surface runoff is slow.

This soil is used as woodland. The major management concerns are the equipment limitation and seedling mortality. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. Landings can be located in the small nearly level areas that may be included in this unit. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. Aspen and red pine are the dominant cover types. Clearcutting is common. If seedlings are planted, site preparation by mechanical or chemical means helps to control competing vegetation.

This soil is fairly well suited to building site development. The slope is the main limitation. Buildings should be designed so that they conform to the natural slope of the land. The soil is poorly suited to septic tank absorption fields because of a poor filtering capacity and the slope. It is generally unsuited to sewage lagoons because of seepage. It soil readily absorbs but does not adequately filter the effluent in septic tank absorption fields. The poor filtering capacity can result in the pollution of ground water. Land shaping and installing the distribution lines across the slope generally help to ensure that the absorption field functions properly.

The woodland ordination symbol is 5S, the land capability classification is IIIe, and the Michigan soil management group is 4a. The primary habitat type is TM, and the secondary habitat type is TMV.

91E—Rousseau fine sand, 15 to 35 percent slopes. This very deep, well drained, rolling to steep soil is on ridges and knolls. Individual areas are elongated or irregularly shaped and range from 10 to 200 acres in size.

Typically, the surface is covered by about 1 inch of well decomposed leaf litter. The surface layer is dark brown fine sand about 1 inch thick. The subsurface layer is brown fine sand about 3 inches thick. The subsoil is fine sand about 22 inches thick. The upper part is dark brown and strong brown and is very friable. The lower part is yellowish brown and is loose. The substratum to a depth of about 60 inches is brownish yellow fine sand.

Permeability is rapid. The available water capacity is low. Surface runoff is slow or medium.

This soil is used as woodland. The major management concerns are the equipment limitation, the erosion hazard, and seedling mortality. The use of equipment is limited because of the slope. Logging roads and skid trails should be constructed in the less sloping areas or on ridgetops. Constructing the roads and skid trails on the contour can minimize erosion. Loose sand can interfere with the traction of wheeled equipment. The number of suitable landing sites is severely limited by the slope. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. The slope hinders site preparation and planting. Aspen and red pine are the dominant cover types. Clearcutting is common. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is generally unsuited to building site development because of the slope. It is generally unsuited to septic tank absorption fields and sewage lagoons because of seepage, a poor filtering capacity, and the slope.

The woodland ordination symbol is 5R, the land capability classification is VIIe, and the Michigan soil management group is 4a. The primary habitat type is TM, and the secondary habitat type is TMV.

92A—Biscuit very fine sandy loam, 0 to 3 percent slopes. This very deep, somewhat poorly drained, nearly level soil is on low plains and knolls. Individual areas are elongated or irregularly shaped and range from 5 to 325 acres in size.

Typically, the surface layer is dark gray very fine sandy loam about 10 inches thick. The subsurface layer is pinkish gray very fine sandy loam about 1 inch thick. The subsoil is about 20 inches thick. The upper part is dark reddish brown, yellowish red, and brown, mottled, friable loamy very fine sand and very fine sandy loam; the next part is reddish brown and brown, friable silt loam; and the lower part is reddish brown, mottled, firm clay. The substratum to a depth of about 60 inches is reddish brown clay. It has thin bands of light gray silt. In places the surface layer is loamy very fine sand or very fine sand.

Included with this soil in mapping are small areas of the poorly drained Gogomain and somewhat poorly drained Rudyard soils. Gogomain soils are in depressions and drainageways. Rudyard soils are clayey throughout. They are in landscape positions similar to those of the Biscuit soil. Also included are small areas of the poorly drained, clayey Soo soils in depressions. Included soils make up about 5 to 15 percent of the map unit.

Permeability is moderate in the loamy upper part of the Biscuit soil and very slow in the clayey lower part. The available water capacity is moderate. Surface runoff is slow. The soil has a perched seasonal high water table at a depth of 0.5 foot to 1.5 feet from late fall to late spring. The potential for frost action is high.

Most areas are used as woodland. Some small areas are used as cropland or pasture. Some areas of abandoned farmland are reverting to speckled alder and willow.

The major concerns in managing woodland are the equipment limitation, the windthrow hazard, seedling mortality, and plant competition. Because of the high water table, the use of equipment is restricted to dry summer months or to winter months when the snow cover is adequate. Landings can be used only when the soil is dry or frozen. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. Because of the wetness, trees on these soils are shallow rooted. Some may be blown down during periods of high winds. Selection of special planting stock, such as containerized seedlings, and special site preparation that protects the surface with thin layers of loose slash can reduce the seedling mortality rate. The aspen cover type is dominant on this soil. Clearcutting is common. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

These soils are fairly well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management needs are measures that remove excess water during wet periods and help to control soil blowing. Shallow surface ditches and a subsurface drainage system can help to remove excess water. Tile lines should be protected with suitable material and installed on a self-cleaning grade so that they do not become clogged with very fine sand and silt. Adding organic material, planting small grain crops or hay, and applying a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface can improve soil structure and permeability and help to control soil blowing. Working the soil when it is wet can result in surface compaction and the formation of ruts.

This soil is well suited to pasture. Overgrazing or grazing when the soil is wet causes surface compaction and destroys forage plants. The forage species that can tolerate wetness, such as trefoil-grass mixtures, should be selected for planting. Proper stocking rates, rotation grazing, and restricted grazing during wet periods help to keep the pasture in good condition.

This soil is poorly suited to building site development because of the wetness and a high shrink-swell potential. It is generally unsuited to septic tank absorption fields because of the wetness and the very slow permeability and to sewage lagoons because of the wetness and seepage.

The woodland ordination symbol is 2W, the land capability classification is IIIw, and the Michigan soil management group is 3/1b. The primary habitat type is TMC, and the secondary habitat type is TMC-D.

93F—Ontonagon-Pickford complex, 0 to 50 percent slopes. This map unit consists of a very deep, steep and very steep, well drained Ontonagon soil on side slopes in ravines and in drainageways and a very deep, nearly level, poorly drained Pickford soil on the bottom of the ravines. The Pickford soil is frequently ponded and is occasionally flooded. Perennial and intermittent streams are on the bottom of the ravines. Individual areas of this unit are elongated or irregularly shaped and range from 10 to 500 acres in size. They are 60 to 80 percent Ontonagon soil and 15 to 30 percent Pickford soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Ontonagon soil has a surface layer of dark brown silt loam about 7 inches thick. The subsoil is about 25 inches thick. The upper part is reddish brown and brown, friable silty clay and silt loam, and the lower part is reddish brown and grayish brown, firm clay. The substratum to a depth of about 60 inches is reddish brown and grayish brown, varved clay. In some places it is stratified with thin bands of silt loam and silty clay loam. In other places the surface layer is loam or silty clay loam.

Typically, the Pickford soil has a surface layer of very dark gray silty clay loam about 8 inches thick. The subsurface layer is dark gray, mottled silty clay loam about 2 inches thick. The subsoil is about 14 inches of weak red, mottled, firm and very firm silty clay and clay. The substratum to a depth of about 60 inches is reddish brown, mottled clay. In places the surface layer is fine sand or fine sandy loam.

Included with these soils in mapping are small areas of the well drained Sugar and somewhat poorly drained Rudyard soils. Sugar soils have a loamy surface layer and subsoil. They are on the slope breaks and side slopes of ravines and in drainageways. Rudyard soils are along the foot slopes of ravines and on slope breaks at the top of ravines. Included soils make up about 5 to 15 percent of the map unit.

Permeability is very slow in the Ontonagon and Pickford soils, and the available water capacity is moderate. Surface runoff is rapid on the Ontonagon soil and very slow or ponded on the Pickford soil. The Pickford soil has a perched seasonal high water table 1 foot above to 1 foot below the surface from fall to early summer.

These soils are used as woodland. The major management concerns are the equipment limitation, the erosion hazard, the windthrow hazard, seedling mortality, and plant competition. Access is limited by the slope and the wet ravine bottoms. The ravine bottoms are generally too wet and narrow for logging roads. Equipment cannot be operated safely on the steep and very steep side slopes. Disturbed areas are subject to erosion. Special logging methods, such as yarding with a cable, may be needed to minimize erosion. Logging roads and skid trails can be located in nearby areas that are better suited. Because of the wetness, trees on the Pickford soil in ravine bottoms are shallow rooted. Some may be blown down during periods of high winds. If trees are planted in the sloping areas, selection of special planting stock, such as containerized seedlings, and special site preparation that protects the surface with thin layers of loose slash can reduce the seedling mortality rate. After the overstory has been removed, plant competition can be controlled by mechanical or chemical means. Aspen and northern hardwoods are the dominant cover types.

These soils are generally unsuited to building site development and septic tank absorption fields because of the slope and the restricted permeability in areas of the Ontonagon soil and the flooding, the ponding, and the restricted permeability in areas of the Pickford soil. The Ontonagon soil is generally unsuited to sewage lagoons because of the slope, and the Pickford soil is generally unsuited because of the flooding and the ponding.

The woodland ordination symbols are 2R and 6W, the land capability classification is VIIe, and the Michigan soil management groups are 0a and 1c. The primary habitat type is TAM, and the secondary habitat type is TTP.

94A—Markey-Kinross-Au Gres complex, 0 to 3 percent slopes. This map unit consists of very deep, nearly level, very poorly drained Markey, poorly drained Kinross, and somewhat poorly drained Au Gres soils. The Markey and Kinross soils are in depressions and drainageways. They are frequently ponded. The Au Gres soil is on low knolls and ridges. Individual areas of this unit are irregular in shape and range from 5 to several thousand acres in size. They are 40 to 60 percent Markey soil, 25 to 45 percent Kinross soil, and 10 to 25 percent Au Gres soil. The three soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Markey soil has a surface layer of dark reddish brown mucky peat about 3 inches thick. Below this is black, dark brown, and dark reddish brown muck about 30 inches thick. The substratum to a depth of about 60 inches is brown sand. In places the surface layer is mucky peat.

Typically, the Kinross soil has a surface layer of black muck about 5 inches thick. The subsurface layer is brown sand about 5 inches thick. The subsoil is dark brown and brown, mottled, very friable and loose sand about 32 inches thick. The substratum to a depth of about 60 inches is grayish brown sand.

Typically, the Au Gres soil is covered by about 1 inch of well decomposed leaf litter and live roots. The surface layer is black sand about 1 inch thick. The subsurface layer is pinkish gray sand about 4 inches thick. The subsoil is mottled sand about 19 inches thick. The upper part is yellowish red and very friable, and the lower part is strong brown and loose. The substratum to a depth of about 60 inches is brownish yellow and light yellowish brown, mottled sand.

Included with these soils in mapping are small areas of the very poorly drained Carbondale and moderately well drained Croswell and Halfaday soils. Carbondale soils have more than 51 inches of muck. They are in landscape positions similar to those of the Markey soil. Croswell and Halfaday soils are on ridges and knolls. Included soils make up about 5 to 15 percent of the map unit.

Permeability is moderately slow to moderately rapid in the organic layers of the Markey soil and rapid in the sandy substratum. It is rapid in the Au Gres and Kinross soils. The available water capacity is high in the Markey soil and low in the Au Gres and Kinross soils. Surface runoff is very slow or ponded on the Kinross and Markey soils and slow on the Au Gres soil. The Markey and Kinross soils have a seasonal high water table 1 foot above to 1 foot below the surface from fall to summer, and the Au Gres soil has one at a depth of 0.5 foot to 1.5 feet from late fall to late spring.

These soils are used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the wetness and the instability of the muck, trees can be logged only during periods in winter when logging roads are frozen. Year-round logging roads should be built in the drier areas. They require fill and a gravel base. Culverts are needed to maintain the natural drainage system. The number of suitable landing sites is severely limited. The landings can be used only during periods when the ground is frozen. Because of the wetness, trees on these soils are shallow rooted. Many may be blown down during periods of high winds and excessive wetness. Aspen and swamp conifers are the dominant cover types on these soils. Clearcutting and strip cutting are common. After the trees are cut, competition from wetland brush can delay or prevent natural regeneration. Trees generally are not planted on these soils because of the wetness, seedling mortality, and plant competition.

The Markey soil is generally unsuited to building site development and septic tank absorption fields because of the ponding, low strength, and subsidence. The Au Gres and Kinross soils are poorly suited to building site development because of the wetness and the ponding and are generally unsuited to septic tank absorption fields because of the wetness and a poor filtering capacity. The soils are generally unsuited to sewage lagoons because of the ponding and seepage.

The woodland ordination symbols are 7W, 2W, and 6W; the land capability classification is VIw; and the Michigan soil management groups are M/4c, 5c, and

5b. The primary habitat type is TTS, and the secondary habitat type is TMC.

95A—Bowers silt loam, 0 to 3 percent slopes. This very deep, somewhat poorly drained, nearly level soil is on broad plains. Individual areas are irregular in shape and range from 5 to 800 acres in size.

Typically, the surface layer is brown silt loam about 8 inches thick. The subsoil is about 18 inches thick. It is mottled and firm. The upper part is reddish brown silty clay loam, and the lower part is brown and pinkish gray, stratified silty clay loam and silt loam. The substratum to a depth of about 60 inches is brown and reddish brown, mottled, stratified silty clay loam and silt loam.

Included with this soil in mapping are small areas of the poorly drained Soo soils in depressions and drainageways. Also included are the somewhat poorly drained Rudyard and Allendale soils. These soils are in landscape positions similar to those of the Bowers soil. Rudyard soils contain more clay than the Bowers soil. Allendale soils have a sandy surface layer and subsoil. Included soils make up about 5 to 15 percent of the map unit.

Permeability is slow in the Bowers soil. The available water capacity is high. Surface runoff is slow. A perched seasonal high water table is at a depth of 1 to 2 feet from late fall to late spring. The potential for frost action is high.

Most areas are used as cropland or pasture. Some are wooded. Some areas of abandoned farmland are reverting to speckled alder and willow.

The major concerns in managing woodland are the equipment limitation, the windthrow hazard, and plant competition. Because of the high water table, the use of equipment is restricted to dry summer months or to winter months when the snow cover is adequate. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Deep ruts tend to expose tree roots, alter soil structure, and restrict lateral drainage. Year-round logging roads should be graveled. Culverts are needed. The use of landing sites is restricted to periods when the soil is dry or frozen. Landings may need to be stabilized so that they can withstand the repeated use of heavy equipment. Because of the wetness, trees on this soil are shallow rooted. Some may be blown down during periods of high winds and excessive wetness. The aspen cover type is dominant on this soil. Clearcutting is common. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management needs are measures that remove excess water during wet periods and that maintain tilth. Shallow surface ditches can help to remove excess water if adequate outlets are available. A subsurface drainage system can help to lower the water table. Erosion-control structures may be needed where surface ditches enter outlet drainageways. When the soil is wet, ruts form easily and the load-bearing capacity is low. Tilling when the soil is at the proper moisture content helps to minimize surface compaction and maintain good soil structure. Returning crop residue to the soil, adding organic material, and applying a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface can improve tilth and increase the content of organic matter.

This soil is well suited to pasture and hay. Overgrazing or grazing when the soil is wet causes surface compaction and destroys forage plants. The forage species that can tolerate wetness, such as trefoil-grass mixtures, should be selected for planting. Proper stocking rates, rotation grazing, and restricted grazing during wet periods help to keep the pasture in good condition.

This soil is poorly suited to building site development because of the wetness. It is generally unsuited to septic tank absorption fields because of the wetness and the slow permeability. It is poorly suited to sewage lagoons because of the wetness. Buildings without basements can be constructed on well compacted, coarse textured fill, which can raise the level of the site above the seasonal high water table. If outlets are available, subsurface drains can be installed around the foundation to remove excess water. Suitable filtering material is needed to keep fine sand and silt from plugging the tile lines.

The woodland ordination symbol is 7W, the land capability classification is IIw, and the Michigan soil management group is 1.5b. The primary habitat type is TTP.

96B—Velvet-Westbury complex, 0 to 6 percent slopes. This map unit consists of a very deep, level and undulating, moderately well drained Velvet soil on low knolls and uplands and a very deep, nearly level, somewhat poorly drained Westbury soil in depressions. Stones and boulders are on the surface. They range from 10 to more than 50 inches in diameter and are 120 to less than 3 feet apart. Individual areas of this unit are irregular in shape and range from 5 to 170 acres in size. They are 40 to 60 percent Velvet soil and 30 to 50 percent Westbury soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Velvet soil is covered by about 2 inches of well decomposed leaf litter. The surface layer is grayish brown very stony loamy sand about 3 inches thick. The subsoil is about 38 inches thick. The upper part is dark brown and strong brown, very friable and loose very stony and very cobbly loamy sand. The lower part is grayish brown and reddish brown, mottled, very firm gravelly loamy sand and gravelly fine sandy loam. The substratum to a depth of about 60 inches is brown gravelly fine sandy loam. In places the surface layer is the cobbly, gravelly, very cobbly, or very gravelly analogs of sand and loamy fine sand or cobbly, gravelly, or very gravelly loamy sand.

Typically, the Westbury soil is covered by about 3 inches of leaf litter. The surface layer is reddish gray, very stony fine sandy loam about 1 inch thick. The subsoil is about 44 inches thick. It is mottled. The upper part is dark brown and dark yellowish brown, friable cobbly silt loam and gravelly fine sandy loam. The lower part is light brown and brown, very firm very gravelly sandy loam. The substratum to a depth of about 60 inches is light brown, mottled very gravelly sandy loam.

Included with these soils in mapping are small areas of the somewhat poorly drained Rudyard and poorly drained Ermatinger soils. Rudyard soils are clayey throughout. They are in landscape positions similar to those of the Velvet and Westbury soils. Ermatinger soils are in depressions. Also included are areas of extremely stony or bouldery soils. Included soils make up about 5 to 10 percent of the map unit.

Permeability is rapid in the upper part of the Velvet soil, very slow in the dense, very firm middle part, and moderate in the substratum. It is very slow in the very firm subsoil of the Westbury soil and moderate in the rest of the profile. From fall to late spring, a perched seasonal high water table is at a depth of 1 to 2 feet in the Velvet soil and at a depth of 0.5 foot to 1.5 feet in the Westbury soil. The available water capacity is low in both soils. Surface runoff is slow. The potential for frost action is high in the Westbury soil.

Most areas are used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. The use of equipment is limited by the wetness and the stony surface. The upper part of the subsoil is saturated during wet periods. Equipment should be used only when the soils are dry or have an adequate snow cover. Landings should be located in the higher, drier areas. Large stones on the surface can reduce the operating speed of skidders or tractors, result in equipment damage, and hinder the construction of logging roads or skid trails. Because of the dense, firm layer and the wetness, trees on these soils are shallow rooted. Some may be blown down during periods of high winds. Aspen and northern hardwoods are the dominant cover types. Clearcutting is common. Tree planting is limited because of the large number of stones on the surface. If trees are planted, selection of special planting stock, such as containerized seedlings, and special site preparation that protects the surface with thin layers of loose slash can reduce the seedling mortality rate. After the overstory has been removed, plant competition can be controlled by mechanical or chemical means.

These soils are poorly suited to pasture. In most areas the stones on the surface make seedbed preparation and pasture improvement difficult. If feasible, removing the stones can improve the pasture. Proper stocking rates, rotation grazing, and restricted grazing during dry periods or wet periods can help to keep the pasture in good condition.

Because of the wetness and the large stones, these soils are poorly suited to buildings without basements and are generally unsuited to buildings with basements. They are poorly suited to septic tank absorption fields because of the restricted permeability in the dense, firm layers and because of the wetness and the large stones. They are generally unsuited to sewage lagoons because of seepage, the wetness, and the large stones. Buildings without basements can be constructed on well compacted fill material, which can raise the site above the high water table. The large stones can cause construction problems. The restricted permeability and the wetness can be overcome on sites for septic tank absorption fields by breaking up the dense, firm layer and by mounding with suitable fill material.

The woodland ordination symbols are 3X and 3W, the land capability classification is VIs, and the Michigan soil management groups are Ga and Gbc. The primary habitat type is TM.

97A—Wega very fine sandy loam, 0 to 3 percent slopes. This very deep, nearly level, somewhat poorly drained soil is on broad flats on former glacial flood plains. Individual areas are irregularly shaped or elongated and range from 5 to 900 acres in size.

Typically, the surface layer is very dark grayish brown very fine sandy loam about 9 inches thick. The substratum extends to a depth of about 60 inches. It is mottled. The upper part is light yellowish brown, pale brown, and brown fine sandy loam; the next part is strong brown and pale brown loamy very fine sand; and the lower part is pale brown and dark gray very fine sandy loam.

Included with this soil in mapping are small areas of the poorly drained Ermatinger soils in the slightly lower landscape positions. These soils make up about 5 to 10 percent of the map unit.

Permeability is moderately slow in the Wega soil. The available water capacity is high. Surface runoff is slow. The seasonal high water table is at a depth of 0.5 foot to 1.5 feet from fall to late spring.

Most areas are woodland or are abandoned farmland that is reverting to woodland. Some are used as cropland.

The major concerns in managing woodland are the equipment limitation, the windthrow hazard, and plant competition. Because of the high water table, the use of equipment is restricted to periods when the soil is dry or has an adequate snow cover. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. Culverts are needed to maintain the natural drainage system. Landings can be used only when the soil is dry or frozen. Because of the wetness, trees on this soil are shallow rooted. Some may be blown down during periods of high winds. The aspen cover type is dominant on this soil, but an area of northern hardwoods is included in the Dunbar Experimental Forest. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management concern is removing excess water during wet periods. A surface drainage system can reduce the wetness if adequate outlets are available. A subsurface drainage system can help to lower the water table. Tile lines should be protected with suitable material and installed on a self-cleaning grade so that they do not become clogged with fine sand and silt.

This soil is well suited to pasture and hay. The forage species that are tolerant of wetness, such as trefoil-grass mixtures, should be selected for planting. Proper stocking rates, rotation grazing, and restricted grazing during wet periods help to keep the pasture in good condition.

This soil is poorly suited to building site development and septic tank absorption fields because of the wetness. A surface or subsurface drainage system helps to lower the water table on sites for buildings. The buildings can be constructed on well compacted fill material, which can raise the level of the site. If a septic tank disposal system is installed, filling or mounding the absorption field with suitable material can raise the site above the seasonal high water table.

The woodland ordination symbol is 3W, the land capability classification is IIw, and the Michigan soil management group is 2.5b. No habitat type is assigned.

98—Ermatinger silt loam. This very deep, nearly level, poorly drained soil is on broad flats on former glacial flood plains. It is frequently ponded. Individual areas are irregular in shape and range from 5 to 1,100 acres in size.

Typically, the surface layer is black silt loam about 8 inches thick. The substratum extends to a depth of about 60 inches. It is mottled. The upper part is grayish brown silt loam, and the lower part is gray and brown very fine sandy loam and loamy very fine sand. In some places mucky layers or decaying vegetation is in the lower part of the substratum. In other places the surface layer is very fine sandy loam, loamy very fine sand, or the mucky analogs of those textures.

Included with this soil in mapping are small areas of the somewhat poorly drained Wega soils on the slightly higher flats. These soils make up about 5 to 10 percent of the map unit.

Permeability is moderate in the Ermatinger soil. The available water capacity is high. Surface runoff is very slow or ponded. The seasonal high water table is 1 foot above to 1 foot below the surface from fall to early summer.

Most areas are used as cropland or pasture. Some are wooded. Some areas of abandoned farmland are reverting to speckled alder and willow.

The major concerns in managing woodland are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the wetness, the use of equipment is restricted to dry summer months or to winter months when the snow cover is adequate. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. Culverts are needed. The number of suitable landing sites is severely limited because of the wetness. Because of the wetness, trees on this soil are shallow rooted. Many may be blown down during periods of high winds. The aspen cover type is dominant on this soil. Clearcutting is common. After the trees are cut, competition from wetland brush can delay or prevent natural regeneration. Trees generally are not planted on this soil because of the the wetness, severe seedling mortality, and plant competition.

This soil is generally unsuited to cropland, but such crops as oats, barley, wheat, and a mixture of grasses and legumes can be grown. The major management need is removing excess water during wet periods. Surface drains can remove the water if adequate outlets are available. Equipment can be used only during dry periods. A subsurface drainage system can help to lower the water table. Tile lines should be protected with suitable material and installed on a self-cleaning grade so that they do not become clogged with fine sand and silt. When the soil is wet, ruts form easily and the load-bearing capacity is low.

This soil is poorly suited to pasture. The forage species that are tolerant of wetness, such as trefoil-grass mixtures, should be selected for planting. Proper stocking rates, rotation grazing, and restricted grazing during wet periods help to keep the pasture in good condition.

This soil is generally unsuited to building site development and to septic tank absorption fields and sewage lagoons because of the ponding.

The woodland ordination symbol is 2W, the land capability classification is Vw, and the Michigan soil management group is 2.5c. The primary habitat type is TAM-Eq.

99A—Westbury stony fine sandy loam, 0 to 3 percent slopes. This very deep, nearly level, somewhat poorly drained soil is on low knolls and upland flats. Stones and small boulders are on the surface. They range from 10 to more than 50 inches in diameter and are 350 to less than 25 feet apart. Individual areas of this soil are irregularly shaped or elongated and range from 5 to 150 acres in size.

Typically, the surface is covered by about 3 inches of leaf litter. The surface layer is reddish gray stony fine sandy loam about 1 inch thick. The subsoil is about 44 inches thick. It is mottled. The upper part is dark brown and dark yellowish brown, friable cobbly silt loam and gravelly fine sandy loam. The lower part is light brown and brown, very firm very gravelly sandy loam. The substratum to a depth of about 60 inches is light brown, mottled very gravelly sandy loam. In places the surface layer is loamy sand, sandy loam, the gravelly or cobbly analogs of those textures, or gravelly or cobbly fine sandy loam.

Included with this soil in mapping are small areas of the poorly drained Pickford soils in depressions and along the edges of the unit and small areas of the moderately well drained Velvet soils in the slightly higher landscape positions. Also included are small areas of the very stony Westbury soils. Included soils make up about 5 to 10 percent of the map unit.

Permeability is very slow in the dense, firm middle part of the Westbury soil and moderate in the rest of the profile. The available water capacity is low. Surface runoff is slow. A perched seasonal high water table is at a depth of 0.5 foot to 1.5 feet from fall to late spring. The potential for frost action is high.

This soil is used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. The use of equipment is limited by the wetness and the stony surface. The upper part of the subsoil is saturated during wet periods. Equipment should be used only during dry summer months or during winter months when the snow cover is adequate. Landings can be used only when the soil is dry or frozen. Large stones on the surface can reduce the operating speed of skidders or tractors and can result in equipment damage. Because of the dense, firm layer and the wetness, trees on this soil are shallow rooted. Some may be blown down during periods of high winds. The aspen cover type is dominant on this soil. Clearcutting is common. The opportunities for planting are limited on this soil because of the wetness, the stones on the surface, severe seedling mortality, and plant competition. If seedlings are planted, selection of special planting stock, such as containerized seedlings, and special site preparation that protects the surface with thin layers of loose slash can reduce the seedling mortality rate. Furrowing before planting also can increase the seedling survival rate. After the overstory has been removed, plant competition can be controlled by mechanical or chemical means.

This soil is poorly suited to building site development because of the wetness and the stoniness. It is generally unsuited to septic tank absorption fields because of the wetness, the stoniness, and the restricted permeability in the dense, firm layer.

The woodland ordination symbol is 3W, the land capability classification is VIIs, and the Michigan soil management group is Gbc. No habitat type is assigned.

101—Chippeny muck. This moderately deep and deep, very poorly drained, nearly level soil is in depressions and on low, broad plains. It is frequently ponded. Individual areas are irregular in shape and range from 3 to 90 acres in size.

Typically, the surface layer is black muck about 20 inches thick. The next layer is dark brown muck about 5 inches thick. The substratum to a depth of about 35 inches is gray very gravelly sandy loam. Limestone bedrock is at a depth of about 35 inches.

Included with this soil in mapping are small areas of the somewhat poorly drained Ensign soils on low knolls. Also included are small areas of the poorly drained Ruse soils in landscape positions similar to those of the Chippeny soil. Ruse soils have a mucky surface layer that is thinner than that of the Chippeny soil. Included soils make up about 5 to 10 percent of the map unit.

Permeability is moderately slow in the upper organic layers of the Chippeny soil and slow to moderate in the lower loamy layers. The available water capacity is high. Surface runoff is very slow or ponded. The water table is 1 foot above to 1 foot below the surface from fall to summer and seldom drops below a depth of 1 foot. The potential for frost action is high.

This soil is used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the wetness and the instability of the muck, trees can be logged only during periods in winter when logging roads are frozen. The swamp conifer cover type is dominant on this soil. Clearcutting is common. Because of the wetness and the depth to bedrock, trees on this soil are shallow rooted. Many may be blown down during periods of high winds. After the trees are cut, competition from wetland brush can prevent or delay natural regeneration. Trees generally are not planted on this soil because of severe seedling mortality, the wetness, and severe plant competition.

This soil is generally unsuited to building site development because of the ponding and low strength. It is generally unsuited to septic tank absorption fields because of seepage, the ponding, and the depth to bedrock and to sewage lagoons because of seepage, excess humus, and the ponding.

The woodland ordination symbol is 4W, the land capability classification is VIIw, and the Michigan soil management group is M/Rc. No habitat type is assigned.

102—Kinross-Dawson complex. This map unit consists of very deep, nearly level, poorly drained Kinross and very poorly drained Dawson soils in depressions and on low plains that have very low ridges. These soils are frequently ponded. Individual areas are irregular in shape and range from 10 to 600 acres in size. They are 35 to 55 percent Kinross soil and 25 to 45 percent Dawson soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Kinross soil has a surface layer of black muck about 5 inches thick. The subsurface layer is brown sand about 5 inches thick. The subsoil is dark brown and brown, mottled, very friable and loose sand about 32 inches thick. The substratum to a depth of about 60 inches is grayish brown sand.

Typically, the Dawson soil has a surface layer of yellowish brown sphagnum moss about 6 inches thick. Below this is dark reddish brown muck about 12 inches thick. The upper part of the substratum is dark brown and pinkish gray fine sand about 1 inch thick. The lower part to a depth of about 60 inches is dark reddish brown and dark brown loamy fine sand and fine sand. In places the organic layers are more than 51 inches thick.

Included with these soils in mapping are small areas of the somewhat poorly drained Wainola and moderately well drained Croswell soils on low knolls and ridges. These included soils make up about 5 to 10 percent of the map unit.

Permeability is rapid in the Kinross soil. It is moderately slow to moderately rapid in the organic layers of the Dawson soil and rapid in the sandy substratum. The available water capacity is low in the Kinross soil and high in the Dawson soil. Surface runoff is very slow or ponded on both soils. The water table is 1 foot above to 1 foot below the surface of both soils from fall to early summer. It seldom drops below a depth of 1 foot. The potential for frost action is high in the Dawson soil.

These soils are used as woodland. Some areas support native bog vegetation and a few trees. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Logging is extremely limited because of the wetness and the instability of the organic material. In areas where the muck is less than 16 inches deep, access is limited to dry summer months or to winter months when the snow cover is adequate. Year-round logging roads require fill and a gravel base. Culverts are needed to maintain the natural drainage system. The number of suitable landing sites is severely limited because of the wetness. Because of the high water table, trees on these soils are shallow rooted. Many may be blown down during periods of high winds. The swamp conifer cover type is dominant on the Kinross soil. After the trees are cut, competition from wetland brush can delay or prevent natural regeneration. Trees generally are not planted on these soils because of the wetness, severe seedling mortality, plant competition, and low productivity.

These soils are generally unsuited to building site development because of the ponding and low strength. They are generally unsuited to septic tank absorption fields because of the ponding, a poor filtering capacity, the restricted permeability, and excess humus and to sewage lagoons because of seepage, excess humus, and the ponding.

The woodland ordination symbol is 2W, the land capability classification is VIw, and the Michigan soil management groups are 5c and Mc-a. The primary habitat type is TTS, and the secondary habitat type is PCS.

103D—Velvet-Rockbottom complex, 6 to 15 percent slopes. These very deep, gently rolling and rolling, moderately well drained soils are on side slopes along the shoreline of Sugar Island. Stones and boulders are on the surface. They range from 10 to more than 50 inches in diameter and are 120 to less than 3 feet apart. Individual areas of this unit are elongated and range from 20 to 250 acres in size. They are 40 to 60 percent Velvet soil and 30 to 50 percent Rockbottom soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Velvet soil is covered by about 2 inches of well decomposed leaf litter. The surface layer is grayish brown very stony loamy sand about 3 inches thick. The subsoil is about 38 inches thick. The upper part is dark brown and strong brown, very friable and loose very stony and very cobbly loamy sand. The lower part is grayish brown and reddish brown, mottled, very firm gravelly loamy sand and gravelly fine sandy loam. The substratum to a depth of about 60 inches is brown gravelly fine sandy loam. In places the surface layer is the gravelly, cobbly, very gravelly, or very cobbly analogs of sand or loamy fine sand or cobbly, gravelly, or very gravelly loamy sand.

Typically, the Rockbottom soil has a surface layer of very dark grayish brown stony silt loam about 6 inches thick. The next layer is mixed, very dark gray and dark grayish brown stony silt loam about 4 inches thick. The subsoil is about 19 inches thick. The upper part is brown, firm silty clay loam, and the lower part is brown, mottled, friable extremely cobbly sandy clay loam. The substratum to a depth of about 60 inches is pale brown, very cobbly fine sandy loam and very gravelly fine sandy loam. In places the surface layer and subsoil are clay. In some areas the substratum is sand.

Included with these soils in mapping are small areas of the moderately well drained Ontonagon and somewhat poorly drained Rudyard soils. These included soils are clayey throughout. Ontonagon soils are in landscape positions similar to those of the Velvet and Rockbottom soils, and Rudyard soils are in shallow depressions and drainageways. Also included are small areas of the extremely stony or bouldery Velvet and Rockbottom soils. Included soils make up about 5 to 20 percent of the map unit.

Permeability is rapid in the upper part of the Velvet soil, very slow in the dense, very firm middle part, and moderate in the substratum. It is moderately slow in the upper part of the Rockbottom soil and moderate in the lower part. The available water capacity is low in the Velvet soil and moderate in the Rockbottom soil. Surface runoff is slow on the Velvet soil and medium on the Rockbottom soil. A perched seasonal high water table is at a depth of 1 to 2 feet in both soils from late fall to late spring.

These soils are used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Large stones on the surface can reduce the operating speed of skidders or tractors, result in equipment damage, and hinder the construction of logging roads. Trafficability may be briefly limited in spring, in fall, and in other excessively wet periods. When the soils are wet, unsurfaced logging roads are slippery and ruts form easily. Deep ruts tend to restrict lateral drainage, expose tree roots, and alter soil structure. Year-round logging roads should be graveled. Landings can be located in the small nearly level areas of this unit, if available, or in the nearly level adjacent areas. Because of the dense, firm layer, trees on these soils are shallow rooted. Some may be blown down during periods of high winds. Aspen and northern hardwoods are the dominant cover types. Species preference can be managed by selective cutting. Trees generally are not planted on these soils because of the large number of stones on the surface.

These soils are poorly suited to building site development because of the wetness and the large stones. The slope also is a limitation in areas where it exceeds 8 percent. The building site should be raised, and a drainage system should be installed to remove excess water. The foundation trench should be widened and backfilled with suitable material. The large stones can cause construction problems. The soils are generally unsuited to septic tank absorption fields because of the wetness, the restricted permeability, and the large stones and to sewage lagoons because of the slope, the large stones, and the wetness.

The woodland ordination symbol is 3X, the land capability classification is VIs, and the Michigan soil management groups are Ga and 2.5a. The primary habitat type is TM.

103E—Velvet-Rockbottom complex, 15 to 35 percent slopes. This map unit consists of very deep, rolling to steep, well drained Velvet and Rockbottom soils on side slopes along the shoreline of Sugar Island. Stones and boulders are on the surface. They range from 10 to more than 50 inches in diameter and are 120 to less than 3 feet apart. Individual areas of this unit are elongated and range from 20 to 80 acres in size. They are 40 to 60 percent Velvet soil and 30 to 50 percent Rockbottom soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Velvet soil is covered by about 2 inches of well decomposed leaf litter. The surface layer is grayish brown very stony loamy sand about 3 inches thick. The subsoil is about 38 inches thick. The upper part is dark brown and strong brown, very friable and loose very cobbly loamy sand. The lower part is grayish brown and reddish brown, very firm gravelly loamy sand and gravelly fine sandy loam. The substratum to a depth of about 60 inches is brown gravelly fine sandy loam. In places the surface layer is the cobbly, gravelly, very cobbly, or very gravelly analogs of sand and loamy fine sand or cobbly, gravelly, or very gravelly loamy sand.

Typically, the Rockbottom soil has a surface layer of very dark grayish brown stony silt loam about 6 inches thick. The next layer is mixed, very dark gray and dark grayish brown stony silt loam about 4 inches thick. The subsoil is about 19 inches thick. The upper part is brown, firm silty clay loam, and the lower part is brown, friable extremely cobbly sandy clay loam. The substratum to a depth of about 60 inches is pale brown, very cobbly fine sandy loam and very gravelly fine sandy loam. In places the surface layer and subsoil are clay. In some areas the substratum is sand.

Included with these soils in mapping are small areas of the well drained Ontonagon soils. These included soils are clayey throughout. They are in landscape positions similar to those of the Velvet and Rockbottom soils. Also included are small areas of the extremely stony or bouldery Velvet and Rockbottom soils. Included soils make up about 5 to 10 percent of the map unit.

Permeability is rapid in the upper part of the Velvet soil, very slow in the dense, very firm middle part, and moderate in the substratum. It is moderately slow in the upper part of the Rockbottom soil and moderate in the lower part. The available water capacity is low in the Velvet soil and moderate in the Rockbottom soil. Surface runoff is slow on the Velvet soil and rapid on the Rockbottom soil.

These soils are used as woodland. The major management concerns are the equipment limitation, the erosion hazard, seedling mortality, the windthrow hazard, and plant competition. The use of equipment is limited because of the slope. Logging roads and skid trails should be constructed in the less sloping areas or on ridgetops. Constructing the roads and skid trails on the contour can minimize erosion. Large stones on the surface can reduce the operating speed of skidders or tractors, result in equipment damage, and hinder the construction of logging roads. Trafficability may be briefly limited in spring, in fall, and in other excessively wet periods. When the soils are wet, unsurfaced logging roads are slippery and ruts form easily. Deep ruts tend to restrict lateral drainage, expose tree roots, and alter soil structure. Year-round logging roads should be graveled. Because of the dense, firm layer, trees on these soils are shallow rooted. Some may be blown down during periods of high winds. Aspen and northern hardwoods are the dominant cover types. Species preference can be managed by selective cutting. Trees generally are not planted on these soils because of the large number of stones on the surface.

These soils are generally unsuited to building site development because of the slope and the large stones. They are generally unsuited to septic tank absorption fields because of the slope, the large stones, and the restricted permeability and to sewage lagoons because of the slope, the large stones, and seepage.

The woodland ordination symbol is 3R, the land capability classification is VIs, and the Michigan soil management groups are Ga and 2.5a. The primary habitat type is TM.

104B—Amasa very fine sandy loam, 0 to 6 percent slopes. This very deep, well drained, nearly level and undulating soil is on upland flats and ridgetops. Individual areas are irregular in shape and range from 5 to 800 acres in size.

Typically, the surface is covered by about 1 inch of partially decomposed leaf litter. The surface layer is black very fine sandy loam about 1 inch thick. The subsurface layer is dark reddish gray very fine sandy loam about 4 inches thick. The subsoil is about 17 inches thick. It is friable. The upper part is dark reddish brown and dark brown very fine sandy loam, and the lower part is strong brown fine sandy loam. The substratum to a depth of about 60 inches is strong brown sand. In some places the substratum is mottled. In other places the surface layer is fine sandy loam or silt loam.

Included with this soil in mapping are small areas of the well drained Rousseau and moderately well drained Sugar soils. These soils are in landscape positions similar to those of the Amasa soil. Rousseau soils are fine sand throughout. Sugar soils have a clayey substratum. Included soils make up about 5 to 15 percent of the map unit.

Permeability is moderate in the loamy upper part of the Amasa soil and very rapid in the sandy substratum. The available water capacity is low. Surface runoff is slow.

Most areas are used as woodland. A few small areas are used as pasture or cropland.

The major concerns in managing woodland are the equipment limitation and plant competition. Trafficability may be briefly limited in spring and in other excessively wet periods. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management concern is controlling water erosion. Grassed waterways, small grain crops, additions of organic material, and a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface help to control erosion.

This soil is well suited to pasture and hay. Overgrazing or grazing when the soil is wet can cause surface compaction, destroy forage plants, and increase the susceptibility to erosion. Proper stocking rates, rotation grazing, strip grazing, and restricted use during wet periods can help to keep the pasture in good condition and prevent excessive erosion.

This soil is well suited to building site development. It is poorly suited to septic tank absorption fields because of a poor filtering capacity. It readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. The soil is generally unsuited to sewage lagoons because of seepage.

The woodland ordination symbol is 3L, the land capability classification is IIe, and the Michigan soil management group is 3/5a. The primary habitat type is ATD, and the secondary habitat type is AVO.

104D—Amasa very fine sandy loam, 6 to 15 percent slopes. This very deep, well drained, gently rolling and rolling soil is on the sides of ridges and knolls. Individual areas are irregularly shaped or elongated and range from 5 to 80 acres in size.

Typically, the surface is covered by about 1 inch of partially decomposed leaf litter. The surface layer is black very fine sandy loam about 1 inch thick. The subsurface layer is dark reddish gray very fine sandy loam about 4 inches thick. The subsoil is about 17 inches thick. It is friable. The upper part is dark reddish brown and dark brown very fine sandy loam, and the lower part is strong brown fine sandy loam. The substratum to a depth of about 60 inches is strong brown sand. In places the surface layer is fine sandy loam or silt loam.

Included with this soil in mapping are small areas of the well drained Rousseau and Sugar soils. These soils are in landscape positions similar to those of the Amasa soil. Rousseau soils are fine sand throughout. Sugar soils have a clayey substratum. Included soils make up about 5 to 15 percent of the unit.

Permeability is moderate in the loamy upper part of the Amasa soil and very rapid in the sandy substratum. The available water capacity is low. Surface runoff is slow.

This soil is used as woodland. The major management concerns are the equipment limitation and plant competition. Trafficability is briefly limited in spring and in other excessively wet periods. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is fairly well suited to building site development. The slope is the main limitation. Buildings should be designed so that they conform to the natural slope of the land. The soil is poorly suited to septic tank absorption fields because of a poor filtering capacity. It readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. The soil is generally unsuited to sewage lagoons because of seepage.

The woodland ordination symbol is 3L, the land capability classification is IIIe, and the Michigan soil management group is 3/5a. The primary habitat type is ATD, and the secondary habitat type is AVO.

104F—Amasa very fine sandy loam, 25 to 50 percent slopes. This very deep, well drained, steep and very steep soil is on ridges, knolls, and side slopes. Individual areas are irregularly shaped or elongated and range from 10 to 80 acres in size.

Typically, the surface is covered by about 1 inch of partially decomposed leaf litter. The surface layer is black very fine sandy loam about 1 inch thick. The subsurface layer is dark reddish gray very fine sandy loam about 4 inches thick. The subsoil is about 17 inches thick. It is friable. The upper part is dark reddish brown and dark brown very fine sandy loam, and the lower part is strong brown fine sandy loam. The substratum to a depth of about 60 inches is strong brown sand. In places the surface layer is fine sandy loam or silt loam.

Included with this soil in mapping are small areas of the well drained Rousseau and Sugar soils. These soils are in landscape positions similar to those of the Amasa soil. Rousseau soils are fine sand throughout. Sugar soils have a clayey substratum. Included soils make up about 5 to 15 percent of the map unit.

Permeability is moderate in the loamy upper part of the Amasa soil and very rapid in the sandy substratum. The available water capacity is low. Surface runoff is rapid.

This soil is used as woodland. The major management concerns are the equipment limitation, the erosion hazard, and plant competition. Access is limited by the slope. Special care is needed in laying out logging roads and in operating equipment. Constructing the roads and skid trails on the contour can minimize erosion. Special logging methods, such as yarding with a cable, may be needed to minimize surface disturbance. Erosion can result from the concentration of runoff on roads, in the tracks of wheeled equipment, and on landings. Removing water with water bars, outsloping road surfaces, culverts, and drop structures minimizes erosion. Landings should be located in the less sloping nearby areas. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. Site preparation and planting are severely limited by the slope. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting.

This soil is generally unsuited to building site development because of the slope. It is generally unsuited to septic tank absorption fields because of the slope and a poor filtering capacity and to sewage lagoons because of seepage and the slope.

The woodland ordination symbol is 3R, the land capability classification is VIIe, and the Michigan soil management group is 3/5a. The primary habitat type is ATD, and the secondary habitat type is AVO.

106A—Potagannissing-Rock outcrop complex, 0 to 3 percent slopes. This map unit consists of a shallow, nearly level, somewhat poorly drained Potagannissing soil and exposed limestone bedrock on large flats, benches, and ridgetops. The Rock outcrop generally occurs as flat areas of exposed bedrock, but vertical drops of 5 to 10 feet are common. Most areas of this unit are on the Maxton Plains on Drummond Island. The Maxton Plains is a unique grassland area where some rare plants are associated with soils that are shallow over limestone bedrock. Individual areas of this unit are irregular in shape and range from 5 to 1,000 acres in size. They are 30 to 60 percent Potagannissing soil and 20 to 70 percent Rock outcrop. The Potagannissing soil and Rock outcrop occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Potagannissing soil has a surface layer of very dark gray gravelly silt loam about 4 inches thick. The substratum to a depth of about 7 inches is yellowish brown, mottled gravelly fine sandy loam. Limestone bedrock is at a depth of about 7 inches. In some places the depth to bedrock is more than 10 inches. In other places the soil is not mottled in the solum. In some areas a thin layer of organic material overlies the surface layer.

Included with this unit in mapping are small areas of the well drained Summerville soils in the slightly higher landscape positions. Also included are areas of the stony or flaggy Potagannissing soils. Included soils make up about 5 to 10 percent of the map unit.

Permeability is moderate in the Potagannissing soil. The available water capacity is very low. Surface runoff is slow. A perched seasonal high water table is at or within a depth of 0.5 foot from late fall to late spring. The potential for frost action is high.

This map unit is used as woodland. The major management concerns are the equipment limitation, seedling mortality, and the windthrow hazard. The exposed bedrock benches can interfere with the use of equipment and road construction and can hinder harvesting. When the soil is wet, ruts form easily. The ruts can alter natural soil drainage and cause ponding along roads. Because of the bedrock, trees on the Potagannissing soil are shallow rooted. Many may be blown down during periods of high winds. Aspen and swamp conifers are the dominant cover types. Trees generally are not planted because of severe seedling mortality, the wetness, the shallowness to bedrock, and the exposed bedrock.

The Potagannissing soil is generally unsuited to building site development, septic tank absorption fields, and sewage lagoons because of the shallowness to bedrock and the wetness.

The woodland ordination symbol assigned to the Potagannissing soil is 3W, the land capability classification is VIIs, and the Michigan soil management group is Rbc. No habitat type is assigned.

107B—Oldman stony fine sandy loam, 2 to 6 percent slopes. This very deep, moderately well drained, nearly level and undulating soil is on side slopes and broad plains. Stones and small boulders are on the surface. They range from 10 to more than 50 inches in diameter and are 350 to less than 25 feet apart. Individual areas of this soil are irregular in shape and range from 10 to 700 acres in size.

Typically, the surface is covered by about 1 inch of well decomposed leaf litter. The surface layer is black stony fine sandy loam about 4 inches thick. The subsurface layer is reddish gray stony fine sandy loam about 1 inch thick. The subsoil is about 55 inches thick. The upper part is dark reddish brown and strong brown, friable very cobbly fine sandy loam and very gravelly fine sandy loam; the next part is reddish brown, light reddish brown, and pinkish gray, mottled, firm very gravelly sandy loam and very gravelly fine sandy loam; and the lower part is pinkish gray and reddish brown, mottled, friable very gravelly fine sandy loam. In places the surface layer is sandy loam, loam, the cobbly or very cobbly analogs of those textures, fine sandy loam, or very cobbly fine sandy loam.

Included with this soil in mapping are small areas of the moderately well drained Ontonagon and somewhat poorly drained Westbury soils. Ontonagon soils are clayey throughout. They are in landscape positions similar to those of the Oldman soil. Westbury soils are on the lower flats and in drainageways. Included soils make up about 5 to 15 percent of the map unit.

Permeability is moderate in the upper part of the Oldman soil, very slow in the dense, very firm middle part, and moderately slow in the lower part. The available water capacity is low. Surface runoff is slow. A perched seasonal high water table is at a depth of 1 to 2 feet from late fall to late spring.

This soil is used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Large stones on the surface can reduce the operating speed of skidders or tractors, result in equipment damage, and hinder the construction of logging roads and skid trails. Equipment should be used only when the soil is dry or has adequate snow cover. During wet periods when the upper part of the subsoil is saturated, unsurfaced logging roads are slippery and ruts form easily. Deep ruts tend to restrict lateral drainage, expose tree roots, and alter soil structure. Year-round logging roads require a gravel base. Because of the dense, firm layer, trees on this soil are shallow rooted. Some may be blown down during periods of high winds. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting. Trees generally are not planted on this soil because of the large number of stones on the surface.

Because of the wetness and the large stones, this soil is poorly suited to buildings without basements and is generally unsuited to buildings with basements. It is poorly suited to septic tank absorption fields because of the restricted permeability in the dense, firm layer and the wetness. It is generally unsuited to sewage lagoons because of the large stones and seepage. Buildings without basements can be constructed on well compacted fill material, which can raise the site above the seasonal high water table. The large stones can cause construction problems. On sites for septic tank absorption fields, the restricted permeability and the wetness can be overcome by breaking up the dense, firm layer and by mounding the site with suitable fill material.

The woodland ordination symbol is 3X, the land capability classification is VIs, and the Michigan soil management group is Ga. The primary habitat type is AVO, and the secondary habitat type is ATD.

108D—Shelter-Alpena complex, 0 to 15 percent slopes. This map unit consists of a very deep, nearly level, somewhat poorly drained Shelter soil and a very deep, gently rolling and rolling, excessively drained Alpena soil. These soils are on upland flats, ridges, and side slopes. Stones and small boulders are on the surface. They range from 10 to more than 50 inches in diameter and are 350 to less than 25 feet apart. Individual areas of this unit are irregular in shape and range from 10 to 200 acres in size. They are 40 to 60 percent Shelter soil and 30 to 50 percent Alpena soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Shelter soil has a surface layer of black very stony loam about 4 inches thick. The next layer is very dark gray and dark brown very stony loam about 2 inches thick. The subsoil is light yellowish brown, mottled, friable very cobbly fine sandy loam about 6 inches thick. The substratum to a depth of about 60 inches is light brownish gray, mottled very cobbly fine sandy loam. In some places limestone bedrock is at a depth of about 40 to 60 inches. In other places the surface layer is the cobbly, gravelly, very cobbly, or very gravelly analogs of loam or silt loam or cobbly, gravelly, or very gravelly loam.

Typically, the Alpena soil is covered by about 3 inches of partially decomposed leaf litter. The surface layer is very dark grayish brown very cobbly sandy loam about 4 inches thick. The subsoil is brown, very friable very cobbly fine sandy loam about 12 inches thick. The substratum to a depth of about 60 inches is pale brown extremely gravelly sand. In some places loamy textures are in the lower part of the substratum. In other places limestone bedrock is at a depth of about 40 to 60 inches. In some areas the surface layer is fine sandy loam, loam, or the gravelly, very gravelly, cobbly, or very cobbly analogs of those textures.

Included with these soils in mapping are small areas of the well drained Posen soils on low knolls. Also included, along lakeshores, are small areas of the extremely stony or bouldery Shelter and Alpena soils. Included soils make up about 5 percent of the map unit.

Permeability is very slow in the Shelter soil and very rapid in the Alpena soil. The available water capacity is low in the Shelter soil and very low in the Alpena soil. Surface runoff is slow on both soils. The Shelter soil has a perched seasonal high water table at a depth of 0.5 to 1.0 foot from late fall to late spring. The potential for frost action is high in the Shelter soil.

These soils are used as woodland. The major management concerns are the equipment limitation, the windthrow hazard, seedling mortality, and plant competition. In the wetter areas, equipment should be used only during dry summer months or during winter months when the snow cover is adequate. In the wetter areas, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads require a gravel base. Large stones on the surface can hinder harvesting and planting and can result in equipment damage. Landings can be located in the nearly level, drier areas that may be included in this unit. Because of the firm substratum and the wetness, trees in the wetter areas are shallow rooted. They may be blown down during periods of high winds. Swamp conifers and aspen are the dominant cover types. Clearcutting is common. Trees generally are not planted on these soils because of the large number of stones on the surface.

The Shelter soil is generally unsuited to building site development because of the wetness and the large stones. It is generally unsuited to septic tank absorption fields because of the wetness, the slope, and the restricted permeability. The Alpena soil is fairly well suited to building site development. The slope is the main limitation. Buildings should be designed so that they conform to the natural slope of the land. The Alpena soil is generally unsuited to sewage lagoons because of seepage. It is poorly suited to septic tank absorption fields because of a poor filtering capacity. It readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water.

The woodland ordination symbols are 4X and 3F, the land capability classification is VIw, and the Michigan soil management groups are Gbc and Ga. No habitat type is assigned.

111—Gutport muck. This moderately deep, very poorly drained, nearly level soil is in depressions on low plains. It is frequently ponded. It occurs mainly on Drummond Island. Individual areas are irregular in shape and range from 5 to 150 acres in size.

Typically, the surface is covered by dark reddish brown, live roots and sphagnum moss about 1 inch thick. The surface layer is black muck about 12 inches thick. The substratum is about 14 inches thick. The upper part is dark gray and gray silt loam and silty clay loam. The lower part is reddish brown and pinkish gray, mottled, varved silty clay. Limestone bedrock is at a depth of about 27 inches. In places the muck surface layer is more than 16 inches thick.

Included with this soil in mapping are small areas of the shallow, somewhat poorly drained Potagannissing soils on low knolls and ridges. These soils make up about 5 to 15 percent of the map unit.

Permeability is moderately slow to moderately rapid in the organic material of the Gutport soil and slow in the clayey part of the substratum. The available water capacity is moderate. Surface runoff is very slow or ponded. The water table is 1 foot above to 1 foot below the surface from fall to summer and seldom drops below a depth of 1 foot. The potential for frost action is high.

This soil is used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the wetness and the instability of the organic surface layer, trees can be logged only during periods in winter when logging roads are frozen. Year-round logging roads require fill and a gravel base. Culverts are needed to maintain the natural drainage system. The number of suitable landing sites is severely limited because of the wetness. The swamp conifer cover type, with a large component of ash, is dominant on this soil. Clearcutting is common. After the trees are cut, competition from wetland brush can delay or prevent natural regeneration. Because of the high water table, the trees are shallow rooted. Many may be blown down during periods of high winds. Trees generally are not planted on this soil because of severe seedling mortality, the wetness, and severe plant competition.

This soil is generally unsuited to building site development because of the ponding and the depth to bedrock. It is generally unsuited to septic tank absorption fields because of the ponding, the depth to bedrock, and the restricted permeability and to sewage lagoons because of seepage, the depth to bedrock, and excess humus.

The woodland ordination symbol is 3W, the land capability classification is VIIw, and the Michigan soil management group is M/Rc. No habitat type is assigned.

112—Soo silty clay loam. This very deep, poorly drained, nearly level soil is on broad plains and in drainageways and depressions. It is frequently ponded. Individual areas are irregular in shape and range from 5 to 1,000 acres in size.

Typically, the surface layer is very dark gray, mottled silty clay loam about 7 inches thick. The subsoil is dark brown, mottled, very firm silty clay loam about 10 inches thick. The substratum to a depth of about 60 inches is reddish brown, mottled silty clay loam. It has thin bands of pinkish gray silt loam. In places the surface layer is loamy fine sand, fine sandy loam, silt loam, or the mucky analogs of those textures.

Included with this soil in mapping are small areas of the somewhat poorly drained Bowers and poorly drained Fibre soils. Bowers soils are on low knolls and ridges and on the slope breaks along streams and drainageways. Fibre soils are in landscape positions similar to those of the Soo soil or are along the edges of drainageways. They have a sandy surface layer and subsoil. Included soils make up about 5 to 15 percent of the map unit.

Permeability is slow in the Soo soil. The available water capacity is moderate. Surface runoff is very slow or ponded. A perched seasonal high water table is 1 foot above to 1 foot below the surface from fall to early summer. The potential for frost action is high.

Most areas are used as cropland or pasture. Some are used as woodland. Some areas of abandoned farmland are reverting to speckled alder and willow.

The major concerns in managing woodland are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the wetness, the use of equipment is restricted to dry summer months or to winter months when the snow cover is adequate. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled and culverts installed. The number of suitable landing sites is severely limited because of the wetness. Because of the high water table, trees on this soil are shallow rooted. Many may be blown down during periods of high winds. The aspen cover type is dominant on this soil. Clearcutting is common. After the trees are cut, competition from wetland brush can delay or prevent natural regeneration. Trees generally are not planted on this soil because of severe seedling mortality, the wetness, and plant competition.

If drained, this soil is well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. It is poorly suited to crops in undrained areas. The major management concerns are removing excess water during wet periods and maintaining tilth. Shallow surface ditches and subsurface drains can help to remove excess water if adequate outlets are available. Erosion-control structures may be needed where surface ditches enter drainageways. Working the soil when it is wet results in surface compaction and the formation of clods. Tilling when the soil is at the proper moisture content can minimize surface compaction and maintain good soil structure. Additions of organic material and a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface can minimize crusting and increase the rate of water infiltration.

This soil is well suited to pasture. Overgrazing or grazing when the soil is too wet can cause surface compaction and destroy forage plants. The forage species that can tolerate wetness, such as trefoil-grass mixtures, should be selected for planting. Proper stocking rates, rotation grazing, and restricted grazing during wet periods help to keep the pasture in good condition.

This soil is poorly suited to building site development because of the ponding. The shrink-swell potential also is a limitation. The soil is generally unsuited to septic tank absorption fields because of the ponding and the restricted permeability. Buildings should be constructed on well compacted, coarse textured fill, which can raise the level of the site. Widening and backfilling foundation trenches with suitable coarse textured material helps to prevent the damage caused by shrinking and swelling. Excess water should be removed from the site. The soil is generally unsuited to sewage lagoons because of the ponding.

The woodland ordination symbol is 6W, the land capability classification is IIw, and the Michigan soil management group is 1.5c. The primary habitat type is TTP.

113—Ruse mucky fine sandy loam. This shallow, poorly drained, nearly level soil is in depressions. It is frequently ponded. Individual areas are irregular in shape and range from 5 to 80 acres in size.

Typically, the surface layer is black mucky fine sandy loam about 5 inches thick. The subsoil is brown and light brownish gray, mottled, friable fine sandy loam about 9 inches thick. Limestone bedrock is at a depth of about 14 inches. In places the bedrock is at a depth of less than 10 inches.

Included with this soil in mapping are small areas of the very poorly drained Chippeny and Carbondale soils. These soils are in landscape positions similar to those of the Ruse soil. Chippeny soils formed in 20 to 40 inches of organic material over bedrock. Carbondale soils formed in more than 51 inches of organic material. Included soils make up about 5 to 10 percent of the map unit.

Permeability is moderate or moderately rapid in the Ruse soil. The available water capacity is low. Surface runoff is very slow or ponded. The seasonal high water table is 1 foot above to 1 foot below the surface from fall to early summer. The potential for frost action is high.

This soil is used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the high water table, the use of equipment is restricted to dry summer months or to winter months when the snow cover is adequate. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads require fill and a gravel base. Culverts are needed to maintain the natural drainage system. Because of the high water table and the bedrock, trees on this soil are shallow rooted. Many may be blown down during periods of high winds. The swamp conifer cover type is dominant on this soil. Clearcutting is common. After the trees are cut, competition from wetland brush can delay or prevent natural regeneration. Trees generally are not planted on this soil because of the wetness, severe seedling mortality, and the shallowness to bedrock.

This soil is generally unsuited to building site development and septic tank absorption fields because of the ponding and the depth to bedrock. It is generally unsuited to sewage lagoons because of seepage, the depth to bedrock, and the ponding.

The woodland ordination symbol is 5W, the land capability classification is VIIw, and the Michigan soil management group is Rbc. No habitat type is assigned.

114B—Velvet very stony loamy sand, 0 to 6 percent slopes. This very deep, moderately well drained, nearly level and undulating soil is on low knolls, ridges, and side slopes. Stones and boulders are on the surface. They range from 10 to more than 50 inches in diameter and are 120 to less than 3 feet apart. Individual areas of this soil are irregularly shaped or elongated and range from 5 to 35 acres in size.

Typically, the surface is covered by about 2 inches of well decomposed leaf litter. The surface layer is grayish brown very stony loamy sand about 3 inches thick. The subsoil is about 38 inches thick. The upper part is dark brown and strong brown, very friable and loose very cobbly and very stony loamy sand. The lower part is grayish brown and reddish brown, mottled, very firm gravelly loamy sand and gravelly fine sandy loam. The substratum to a depth of about 60 inches is brown gravelly fine sandy loam. In places the surface layer is the gravelly, cobbly, very gravelly, or very cobbly analogs of sand or loamy fine sand or cobbly, gravelly, or very gravelly loamy sand.

Included with this soil in mapping are small areas of the somewhat poorly drained Westbury and poorly drained Pickford soils. Westbury soils are in the slightly lower landscape positions. Pickford soils are clayey throughout. They are in depressions. Also included are small areas of the extremely stony Velvet soils. Included soils make up about 5 to 15 percent of the map unit.

Permeability is rapid in the upper part of the Velvet soil, very slow in the dense, very firm middle part, and moderate in the substratum. The available water capacity is low. Surface runoff is slow. A perched seasonal high water table is at a depth of 1 to 2 feet from late fall to late spring.

Most areas are used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. The use of equipment is restricted by wetness in fall, in spring, and in other excessively wet periods when the upper part of the subsoil is saturated. During these periods, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads require a gravel base. Large stones on the surface can reduce the operating speed of skidders or tractors, result in equipment damage, and hinder the construction of logging roads and skid trails. Because of the dense, firm layer, trees on this soil are shallow rooted. Some may be blown down during periods of high winds. The aspen cover type is dominant on this soil, but small areas of northern hardwoods are common. Clearcutting is common. Trees generally are not planted on this soil because of the large number of stones on the surface.

Because of the wetness and the large stones, this soil is poorly suited to buildings without basements and is generally unsuited to buildings with basements. It is poorly suited to septic tank absorption fields because of the restricted permeability in the dense, firm layer, the wetness, and the large stones. It is generally unsuited to sewage lagoons because of the large stones and seepage. Buildings without basements can be constructed on well compacted fill material, which can raise the site above the water table. The large stones can cause construction problems. If septic tank absorption fields are used, the restricted permeability and the wetness can be overcome by breaking up the dense, firm layer and using fill to mound the site.

The woodland ordination symbol is 3X, the land capability classification is VIs, and the Michigan soil management group is Ga. The primary habitat type is TM, and the secondary habitat type is ATD.

114D—Velvet very stony loamy sand, 6 to 15 percent slopes. This very deep, moderately well drained, gently rolling and rolling soil is on knolls and ridges. Stones and boulders are on the surface. They range from 10 to more than 50 inches in diameter and are 120 to less than 3 feet apart. Individual areas of this soil are irregularly shaped or elongated and range from 10 to 80 acres in size.

Typically, the surface is covered by about 2 inches of well decomposed leaf litter. The surface layer is grayish brown very stony loamy sand about 3 inches thick. The subsoil is about 38 inches thick. The upper part is dark brown and strong brown, very friable and loose very cobbly and very stony loamy sand. The lower part is grayish brown and reddish brown, mottled, very firm gravelly loamy sand and gravelly fine sandy loam. The substratum to a depth of about 60 inches is brown gravelly fine sandy loam. In places the surface layer is gravelly, cobbly, very gravelly, or very cobbly analogs of sand or loamy fine sand or cobbly, gravelly, or very gravelly loamy sand.

Included with this soil in mapping are small areas of the moderately well drained Ontonagon soils. These soils are in landscape positions similar to those of the Velvet soil. They are clayey throughout. Also included are small areas of the extremely stony or bouldery Velvet soils. Included soils make up about 5 to 10 percent of the map unit.

Permeability is rapid in the upper part of the Velvet soil, very slow in the dense, very firm middle part, and moderate in the substratum. The available water capacity is low. Surface runoff is slow. A perched seasonal high water table is at a depth of 1 to 2 feet from late fall to late spring.

This soil is used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Large stones on the surface can reduce the operating speed of skidders or tractors, result in equipment damage, and hinder the construction of logging roads and skid trails. Landings can be located in the small nearly level areas that may be included in this unit. Trafficability is briefly limited in spring, in fall, and in other excessively wet periods when the upper part of the subsoil is saturated. When the soil is wet, year-round logging roads are slippery and ruts form easily. Because of the dense, firm layer, trees on this soil are shallow rooted. Some may be blown down during periods of high winds. Aspen and northern hardwoods are the dominant cover types. Species preference can be managed by selective cutting. Trees generally are not planted on this soil because of the large number of stones on the surface.

Because of the wetness and the large stones, this soil is poorly suited to buildings without basements and is generally unsuited to buildings with basements. In areas where it exceeds 8 percent, the slope is a limitation. The soil is poorly suited to septic tank absorption fields because of the restricted permeability in the dense, firm layer and the large stones. It is generally unsuited to sewage lagoons because of seepage and the large stones. The large stones and the dense, firm layer can cause construction problems. Buildings without basements can be constructed on well compacted fill material, which can raise the site above the water table. The buildings should be designed so that they conform to the natural slope of the land. On sites for septic tank absorption fields, the restricted permeability can be overcome by breaking up the dense, firm layer. Land shaping and installing the distribution lines across the slope generally help to ensure that the absorption field functions properly.

The woodland ordination symbol is 3X, the land capability classification is VIs, and the Michigan soil management group is Ga. The primary habitat type is TM, and the secondary habitat type is ATD.

116—Udorthents, nearly level. This map unit consists of soils that are the result of cutting and filling. The original soil material has been altered to such an extent that a recognizable soil profile is no longer evident. The original ridges have been leveled. The lower, wetter, and poorly drained depressions and pot holes have been filled. Some areas of this unit consist of soil covering municipal or industrial waste. The soils range in texture from loam to clay. The soil material is moderately well drained to poorly drained. In some areas there is a slight darkening of the surface caused by grass roots and other decaying vegetation. Individual areas of this unit are irregular in shape and range from 10 to 150 acres in size.

Included with these soils in mapping are small areas of undisturbed Pickford and Rudyard soils. Also included are small areas of soils that are more sandy than the Udorthents. Included soils make up about 5 to 10 percent of the map unit.

Areas of these soils are used mainly as urban land or are idle. The soils have limited suitability for most uses. Onsite investigation is needed to determine specific soil properties.

No interpretive groups are assigned.

117B—Manistee sand, 0 to 6 percent slopes. This very deep, moderately well drained, nearly level and undulating soil is on broad plains, ridgetops, and side slopes. Individual areas are irregular in shape and range from 5 to 125 acres in size.

Typically, the surface is covered by about 3 inches of well decomposed leaf litter. The surface layer is pinkish gray sand about 9 inches thick. The subsoil is about 26 inches thick. It is firm. The upper part is dark reddish brown sand; the next part is dark brown, mottled sand; and the lower part is reddish brown and pinkish gray, mottled silty clay loam and loamy sand. The substratum to a depth of about 60 inches is reddish brown clay.

Included with this soil in mapping are small areas of the somewhat poorly drained Allendale, moderately well drained Ocqueoc, and well drained Rousseau and Superior soils. Allendale soils are in depressions. Ocqueoc, Rousseau, and Superior soils are in landscape positions similar to those of the Manistee soil. Ocqueoc soils have a stratified, sandy and loamy substratum. Rousseau soils are sandy throughout. Superior soils are loamy in the surface layer and in the upper part of the subsoil. Included soils make up about 5 to 15 percent of the map unit.

Permeability is rapid in the sandy upper part of the Manistee soil and slow and very slow in the clayey lower part. The available water capacity is low. Surface runoff is slow. A perched seasonal high water table is at a depth of 2.5 to 4.0 feet from late fall to late spring.

Most areas are used as woodland. The major management concerns are the equipment limitation, seedling mortality, and plant competition. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. The use of equipment is limited in spring, in fall, and in other excessively wet periods. Logging equipment can cause deep ruts. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the low available water capacity in the upper 20 inches. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting. Some areas are clearcut. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is fairly well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management needs are measures that conserve moisture, maintain the organic matter content, and help to control soil blowing. Examples are buffer strips, vegetative barriers, field windbreaks, small grain crops, additions of organic material, and a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface.

This soil is well suited to pasture. Overgrazing during dry periods can destroy the plant cover. The major management concern is droughtiness. Proper stocking rates, rotation grazing, strip grazing, and restricted use during dry periods help to keep the pasture in good condition.

This soil is fairly well suited to building site development. The wetness and a high shrink-swell potential are limitations on sites for buildings with basements. These buildings can be constructed on well compacted fill material, which raises the level of the site. A drainage system helps to lower the seasonal high water table. The soil is poorly suited to septic tank absorption fields because of the wetness, a poor filtering capacity in the upper part of the profile, and the very slow permeability in the lower part. It readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. Filling or mounding the absorption field with suitable material can raise the site above the seasonal high water table. The soil is generally unsuited to sewage lagoons because of seepage.

The woodland ordination symbol is 3S, the land capability classification is IIIs, and the Michigan soil management group is 4/1a. No habitat type is assigned.

117D—Manistee sand, 6 to 15 percent slopes. This very deep, well drained, gently rolling and rolling soil is on the sides of ridges and knolls. Individual areas are elongated or irregularly shaped and range from 5 to more than 40 acres in size.

Typically, the surface is covered by about 3 inches of well decomposed leaf litter. The surface layer is pinkish gray sand about 9 inches thick. The subsoil is about 26 inches thick. It is firm. The upper part is dark reddish brown and dark brown sand. The lower part is reddish brown and pinkish gray silty clay loam and loamy sand. The substratum to a depth of about 60 inches is reddish brown clay.

Included with this soil in mapping are small areas of the well drained Ocqueoc, Rousseau, and Superior soils. These soils are in landscape positions similar to those of the Manistee soil. Ocqueoc soils have a stratified, sandy and loamy substratum. Rousseau soils are sandy throughout. Superior soils are loamy in the surface layer and in the upper part of the subsoil. Included soils make up about 5 to 15 percent of the map unit.

Permeability is rapid in the sandy upper part of the Manistee soil and slow and very slow in the clayey lower part. The available water capacity is low. Surface runoff is slow.

This soil is used as woodland. The major management concerns are the equipment limitation, seedling mortality, and plant competition. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. Logging roads should be stabilized. Landings can be located in the small nearly level areas that may be included in this unit. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the low available water capacity in the upper part of the profile. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting. Some areas are clearcut. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is fairly well suited to building site development. The slope is the main limitation. A high shrink-swell potential is an additional limitation on sites for buildings with basements. The soil is poorly suited to septic tank absorption fields because of a poor filtering capacity in the upper part of the profile, the restricted permeability in the lower part, and the slope. It is generally unsuited to sewage lagoons because of seepage and the slope. Buildings should be designed so that they conform to the natural slope of the land. The soil readily absorbs but does not adequately filter the effluent in septic tank absorption fields. Filling or mounding the field with suitable material can raise the site above the water table. Land shaping and installing the distribution lines across the slope generally help to ensure that the absorption field functions properly.

The woodland ordination symbol is 3S, the land capability classification is IIIe, and the Michigan soil management group is 4/1a. No habitat type is assigned.

117F—Manistee sand, 25 to 50 percent slopes. This very deep, well drained, steep and very steep soil is on the sides of ridges and in ravines. Some areas are dissected by shallow drainageways. Individual areas are elongated and range from 5 to 60 acres in size.

Typically, the surface is covered by about 3 inches of well decomposed leaf litter. The surface layer is pinkish gray sand about 9 inches thick. The subsoil is about 26 inches thick. It is firm. The upper part is dark reddish brown and dark brown sand, and the lower part is reddish brown and pinkish gray silty clay loam and loamy sand. The substratum to a depth of about 60 inches is reddish brown clay.

Included with this soil in mapping are small areas of the somewhat excessively drained Kalkaska and well drained Ontonagon soils. These soils are in landscape positions similar to those of the Manistee soil. Kalkaska soils are sandy throughout. Ontonagon soils are clayey throughout. Included soils make up about 5 to 10 percent of the map unit.

Permeability is rapid in the sandy upper part of the Manistee soil and slow and very slow in the clayey lower part. The available water capacity is low. Surface runoff is medium.

This soil is used as woodland. The major management concerns are the equipment limitation, the erosion hazard, seedling mortality, and plant competition. Access is limited by the slope. Special care is needed in laying out logging roads and in operating equipment. The roads can be designed so that they conform to the natural slope of the land. Special logging methods, such as yarding with a cable, may be needed to minimize surface disturbance. Loose sand and the slope can interfere with the traction of wheeled equipment. Erosion can result from the concentration of runoff on roads, in the tracks of wheeled equipment, and on landings. Removing water with water bars, outsloping road surfaces, culverts, and drop structures minimizes erosion. Seedling mortality can be a problem during dry periods because of the low available water capacity, especially on south aspects. Site preparation and planting are severely limited by the slope. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting.

This soil is generally unsuited to building site development and septic tank absorption fields because of the slope.

The woodland ordination symbol is 3R, the land capability classification is VIIe, and the Michigan soil management group is 4/1a. No habitat type is assigned.

119—Gogomain very fine sandy loam. This very deep, poorly drained, nearly level soil is on low, broad plains. It is frequently ponded. Individual areas are irregular in shape and range from 5 to 2,000 acres in size.

Typically, the surface layer is black very fine sandy loam about 6 inches thick. The subsoil is about 31 inches thick. It is mottled and very friable. The upper part is grayish brown and pale brown very fine sandy loam and loamy very fine sand, and the lower part is brown very fine sand. The substratum to a depth of about 60 inches is light reddish brown and pinkish gray, mottled clay. In some places the surface layer is loamy very fine sand or silt loam. In other places a thin organic layer overlies the surface layer.

Included with this soil in mapping are small areas of the somewhat poorly drained Biscuit and poorly drained Fibre and Pickford soils. Biscuit soils are on low knolls and ridges. Fibre soils have a sandy surface layer and subsoil. Pickford soils are clayey throughout. Fibre and Pickford soils are in landscape positions similar to those of the Gogomain soil. Included soils make up about 5 to 15 percent of the map unit.

Permeability is moderately rapid in the loamy upper part of the Gogomain soil and very slow in the clayey substratum. The available water capacity is moderate. Surface runoff is very slow or ponded. A perched seasonal high water table is 1 foot above to 1 foot below the surface from fall to early summer.

Most areas are used as woodland. Some are idle grassland or abandoned farmland reverting to speckled alder and willow.

The major concerns in managing woodland are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the wetness, the use of equipment is restricted to dry summer months or to winter months when the snow cover is adequate. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. Culverts are needed. The number of suitable landing sites is severely limited because of the wetness. Because of the wetness, trees on this soil are shallow rooted. Many may be blown down during periods of high winds. The aspen cover type is dominant on this soil. Clearcutting is common. After the trees are cut, competition from wetland brush can delay or prevent natural regeneration. Trees generally are not planted on this soil because of the wetness, severe seedling mortality, and plant competition.

This soil is generally unsuited to cropland, but such crops as oats, barley, wheat, and a mixture of grasses and legumes can be grown. The major management concern is removing excess water during wet periods.

Surface drains can help to remove water if adequate outlets are available. Ruts form easily, and the load-bearing capacity is low. As a result, fieldwork should be done during dry periods. If subsurface tile is used, the tile lines should be protected with suitable material and installed on a self-cleaning grade so that they do not become clogged with fine sand and silt.

This soil is poorly suited to pasture. The forage species that are tolerant of wetness, such as trefoil-grass mixtures, should be used. Proper stocking rates, rotation grazing, and restricted grazing during wet periods help to keep the pasture in good condition.

This soil is generally unsuited to building site development because of the ponding. It is generally unsuited to septic tank absorption fields because of the ponding and the restricted permeability. It is generally unsuited to sewage lagoons because of seepage and the ponding.

The woodland ordination symbol is 4W, the land capability classification is Vw, and the Michigan soil management group is 3/1c. No habitat type is assigned.

121B—Rockbottom stony silt loam, 2 to 6 percent slopes. This very deep, moderately well drained, nearly level and undulating soil is on ridges, side slopes, and knolls. Stones and small boulders are on the surface. They range from 10 to more than 50 inches in diameter and are 350 to less than 25 feet apart. Individual areas of this soil are irregularly shaped or elongated and range from 5 to 80 acres in size.

Typically, the surface layer is very dark grayish brown stony silt loam about 6 inches thick. The next layer is mixed very dark gray and dark grayish brown stony silt loam about 4 inches thick. The subsoil is about 19 inches thick. The upper part is brown, mottled, firm silty clay loam, and the lower part is brown, friable extremely cobbly sandy clay loam. The substratum to a depth of about 60 inches is pale brown very gravelly fine sandy loam. In some places the subsoil is clay. In other places the surface layer is silt loam, loam, fine sandy loam, or clay. In some areas the surface layer and the upper part of the subsoil are extremely stony.

Included with this soil in mapping are small areas of the moderately well drained Oldman and somewhat poorly drained Shelter soils. Oldman soils contain less clay than the Rockbottom soil. They are in landscape positions similar to those of the Rockbottom soil. Shelter soils are in the slightly lower landscape positions. Included soils make up about 5 to 15 percent of the map unit.

Permeability is moderately slow in the clayey upper part of the Rockbottom soil and moderate in the loamy lower part. The available water capacity is moderate. Surface runoff is slow. A perched seasonal high water table is at a depth of 1.5 to 2.5 feet from late fall to late spring.

This soil is used as woodland. The major management concerns are the equipment limitation and plant competition. Trafficability is briefly limited in spring and in other excessively wet periods. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. Large stones on the surface can hinder harvesting and planting and can result in equipment damage. Northern hardwoods and aspen are the dominant cover types. Species preference can be managed by selective cutting. Trees generally are not planted on this soil because of the large number of stones on the surface.

This soil is poorly suited to building site development because of the wetness. It is generally unsuited to septic tank absorption fields because of the wetness and the restricted permeability. It is poorly suited to sewage lagoons because of seepage. On sites for buildings, the foundation trench should be widened and backfilled with suitable coarse textured material. The building site should be raised, and a drainage system should be installed to remove excess water.

The woodland ordination symbol is 3X, the land capability classification is VIs, and the Michigan soil management group is 2.5a. No habitat type is assigned.

122—Pits, quarry. This map unit consists of open excavations from which dolomite limestone has been removed. Most areas are actively mined. The outer edges of these excavations have steep vertical side slopes. Some areas have been excavated into underground springs or below the water table and have formed small lakes. The unused rubble material on the sides of the excavations supports some vegetation, mainly northern whitecedar and paper birch. Some of the rubble is used for roads. Individual areas of this unit range from 5 to 400 acres in size.

No interpretive groups are assigned.

123B—Ocqueoc fine sand, 0 to 6 percent slopes. This very deep, moderately well drained, nearly level and undulating soil is on upland flats and ridgetops. Individual areas are irregular in shape and range from 5 to 400 acres in size.

Typically, the surface is covered by about 2 inches of well decomposed leaf litter. The surface layer is pinkish gray fine sand about 8 inches thick. The subsoil is about 14 inches thick. The upper part is dark reddish brown, dark brown, and brown, very friable and loose fine sand, and the lower part is dark yellowish brown, very friable loamy fine sand. The substratum to a depth of about 60 inches is brown and yellowish brown, mottled, stratified fine sand to very fine sandy loam.

Included with this soil in mapping are small areas of the moderately well drained Alcona, well drained Rousseau, and somewhat poorly drained Ingalls soils. Alcona soils are finer textured throughout than the Ocqueoc soil. Rousseau soils are fine sand throughout. Alcona and Rousseau soils are in landscape positions similar to those of the Ocqueoc soil. Ingalls soils are in depressions. Included soils make up about 5 to 15 percent of the map unit.

Permeability is rapid in the sandy upper part of the Ocqueoc soil and moderately slow in the substratum. The available water capacity is moderate. Surface runoff is slow. The seasonal high water table is at a depth of 2.5 to 6.0 feet from late fall to late spring.

Most areas are used as woodland. The major management concerns are the equipment limitation and plant competition. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. The use of equipment is limited in spring, in fall, and in other excessively wet periods. The mortality of planted or naturally established seedlings can be a problem because of the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting. Some areas are clearcut. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is fairly well suited to building site development. The wetness and the shrink-swell potential are limitations on sites for buildings with basements. Buildings with basements can be constructed on well compacted fill material, which raises the level of the site above the water table. A drainage system helps to lower the seasonal high water table. The soil is poorly suited to septic tank absorption fields because of a poor filtering capacity in the upper part of the profile and the wetness and the restricted permeability in the lower part. The upper part of the soil readily absorbs but does not adequately filter the effluent. Filling or mounding the absorption field with suitable material can raise the site above the seasonal high water table. The soil is generally unsuited to sewage lagoons because of seepage and the wetness.

The woodland ordination symbol is 3S, the land capability classification is IIIs, and the Michigan soil management group is 4/2a. No habitat type is assigned.

124D—Alpena very cobbly sandy loam, 0 to 15 percent slopes. This very deep, excessively drained, nearly level to rolling soil is on upland flats and ridges. Individual areas are irregularly shaped or elongated and range from 5 to 150 acres in size.

Typically, the surface is covered by about 3 inches of partially decomposed leaf litter. The surface layer is very dark grayish brown very cobbly sandy loam about 4 inches thick. The subsoil is brown, very friable very cobbly fine sandy loam about 12 inches thick. The substratum to a depth of about 60 inches is pale brown extremely gravelly sand. In some places loamy textures are in the lower part of the substratum. In other places the surface layer is fine sandy loam, loam, or the gravelly, very gravelly, cobbly, or very cobbly analogs of those textures.

Included with this soil in mapping are small areas of the well drained Posen and somewhat poorly drained Shelter soils. Posen soils are finer textured throughout than the Alpena soil. They are in landscape positions similar to those of the Alpena soil. Shelter soils are in the slightly lower landscape positions. Also included are small areas of the stony Alpena soils. Included soils make up about 5 to 10 percent of the map unit.

Permeability is very rapid in the Alpena soil. The available water capacity is very low. Surface runoff is slow.

This soil is used as woodland. The major management concerns are the equipment limitation and seedling mortality. Trafficability may be briefly limited in spring and in other excessively wet periods. When the soil is wet, unsurfaced logging roads are slippery. Where possible, logging roads and skid trails can be designed so that they conform to the natural slope of the land. Landings can be located in the small nearly level areas within the unit. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. The swamp conifer cover type is dominant on this soil. Some areas are clearcut. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is well suited to building site development. The slope is a management concern in areas where it exceeds 8 percent. The buildings should be designed so that they conform to the natural slope of the land. The soil is poorly suited to septic tank absorption fields because of a poor filtering capacity. It readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. The soil is generally unsuited to sewage lagoons because of seepage.

The woodland ordination symbol is 3F, the land capability classification is VIs, and the Michigan soil management group is Ga. No habitat type is assigned.

125B—Croswell-Markey complex, 0 to 6 percent slopes. This map unit consists of a very deep, nearly level and undulating, moderately well drained Croswell soil on low ridges and knolls and a very deep, nearly level, very poorly drained Markey soil in depressions and drainageways. The Markey soil is frequently ponded. Individual areas of this unit are irregular in shape and range from 5 to 700 acres in size. They are 45 to 60 percent Croswell soil and 25 to 45 percent Markey soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Croswell soil is covered by about 2 inches of black, partially decomposed leaf litter. The surface layer is brown sand about 2 inches thick. The subsoil is strong brown and yellowish brown, very friable and friable sand about 15 inches thick. The substratum to a depth of about 60 inches is light yellowish brown and brownish yellow, mottled sand.

Typically, the Markey soil has a surface layer of dark reddish brown mucky peat about 3 inches thick. Below this is black, dark brown, and dark reddish brown muck about 30 inches thick. The substratum to a depth of about 60 inches is brown sand. In places the soil has less than 16 inches of organic material.

Included with these soils in mapping are small areas of the somewhat poorly drained Au Gres and excessively drained Rubicon soils. Au Gres soils are in the lower landscape positions. Rubicon soils are in the higher landscape positions. Included soils make up about 5 to 10 percent of the map unit.

Permeability is rapid in the Croswell soil. It is moderately slow to moderately rapid in the organic part of the Markey soil and rapid in the sandy substratum. The available water capacity is low in the Croswell soil and high in the Markey soil. Surface runoff is slow on the Croswell soil and very slow or ponded on the Markey soil. The water table is at a depth of 2 to 4 feet from late fall to late spring in the Croswell soil. It is 1 foot above to 1 foot below the surface from fall to early summer in the Markey soil and seldom drops below a depth of 1 foot. The potential for frost action is high in the Markey soil.

These soils are used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the wetness and the instability of the muck, trees can be logged only during periods in winter when logging roads are frozen. Roads and landings should be located on the ridges. Seedling mortality is a problem on the ridges because of droughtiness and in the depressions because of the wetness. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate on the sandy ridges. Trees in the wetter areas are shallow rooted. Some may be blown down during periods of high winds. Aspen and swamp conifers are the dominant cover types. Clearcutting is common. After the trees are cut, competition from wetland brush can delay or prevent natural regeneration. Plant competition is severe in the mucky areas because of the wetness. If trees are planted on the ridges, site preparation by mechanical or chemical means is needed to control competing vegetation.

The Croswell soil is fairly well suited to building site development. The wetness is a limitation on sites for buildings with basements. These buildings can be constructed on well compacted fill material, which raises the level of the site above the water table. A drainage system helps to lower the water table. The Croswell soil is poorly suited to septic tank absorption fields because of the wetness and a poor filtering capacity. If a septic tank disposal system is installed, filling or mounding the absorption field with suitable material can raise the site above the seasonal high water table. The Croswell soil readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. The Markey soil is generally unsuited to building site development because of the ponding and low strength. It is generally unsuited to septic tank absorption fields because of excess humus, the ponding, and a poor filtering capacity and to sewage lagoons because of seepage, excess humus, and the ponding.

The woodland ordination symbols are 5S and 2W, the land capability classification is IVs, and the Michigan soil management groups are 5a and M/4c. The primary habitat type is TM, and the secondary habitat type is TTS.

126—Pickford silt loam. This very deep, poorly drained, nearly level soil is on broad plains. It is frequently ponded. Individual areas are irregular in shape and range from 5 to 3,000 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 7 inches thick. The subsurface layer is light brownish gray, mottled silty clay loam about 2 inches thick. The subsoil is about 14 inches of weak red, mottled, firm and very firm silty clay and clay. The substratum to a depth of about 60 inches is reddish brown, mottled clay. In places it is varved or stratified with thin bands of silt loam and silty clay loam. In some areas the surface layer is sandy loam.

Included with this soil in mapping are small areas of

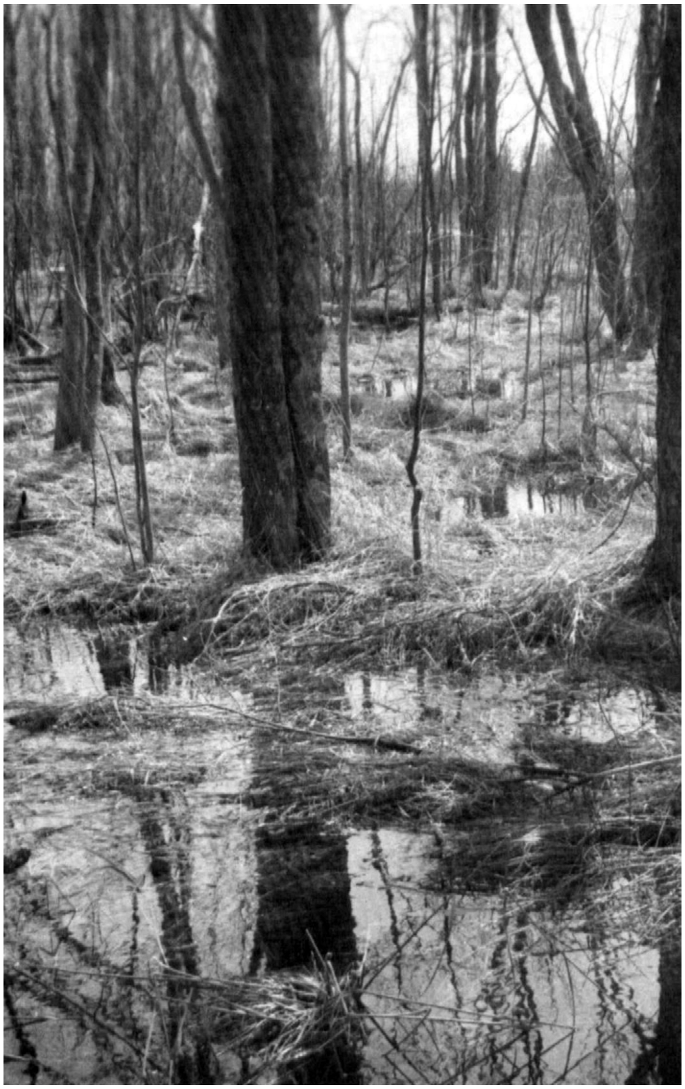


Figure 8.—Ponding in an area of Pickford silt loam.

the somewhat poorly drained Bowers and Rudyard soils. Bowers soils have a stratified, silty substratum. Rudyard and Bowers soils are on low knolls, on ridges, and on the side slopes along streams and drainageways. They make up about 5 to 15 percent of the map unit.

Permeability is very slow in the Pickford soil. The available water capacity is moderate. Surface runoff is very slow or ponded. A perched seasonal high water table is 1 foot above to 1 foot below the surface from late fall to early summer (fig. 8).

Most areas are used as cropland or pasture. Some are used as woodland. Some areas of abandoned farmland are reverting to speckled alder and willow.

The major concerns in managing woodland are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the high water table, the use of equipment is restricted to dry summer months or to winter months when the snow cover is adequate. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. Culverts are needed. The number of suitable landing sites is severely limited because of the wetness. Because of the high water table, trees on this soil are shallow rooted. Many may be blown down during periods of high winds. The aspen cover type is dominant on this soil. Clearcutting is common. After the trees are cut, competition from wetland brush can delay or prevent natural regeneration. Trees generally are not planted on this soil because of severe seedling mortality, the wetness, and severe plant competition.

If drained, this soil is fairly well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. It is poorly suited to these crops in undrained areas. The major management needs are measures that remove excess water during wet periods, maintain tilth, and minimize surface compaction. Shallow surface ditches can help to remove excess water if adequate outlets are available. A subsurface drainage system can lower the water table. Erosion-control structures may be needed where surface ditches enter drainageways. When the soil is wet, ruts form easily and the load-bearing capacity is low. Working the soil when it is wet results in surface compaction and the formation of clods. Returning crop residue to the soil, applying a system of conservation tillage, and adding organic material improve tilth and minimize surface compaction.

This soil is well suited to pasture and hay. Overgrazing or grazing when the soil is wet causes surface compaction and destroys forage plants. The forage species that can tolerate wetness, such as trefoil-grass mixtures, should be selected for planting. Proper stocking rates, rotation grazing, and restricted grazing during wet periods help to keep the pasture in good condition.

This soil is poorly suited to building site development because of the ponding. A moderate shrink-swell potential also is a limitation on building sites. The soil is generally unsuited to septic tank absorption fields and buildings with basements because of the wetness and the very slow permeability. It is poorly suited to sewage lagoons. It is well suited, however, if the excavation site is properly banked and the lagoon is sealed. Building sites should be raised, and a drainage system should be installed to remove excess water. The foundation trench should be widened and backfilled with suitable coarse textured material, which reduces the shrink-swell potential.

The woodland ordination symbol is 6W, the land capability classification is IIIw, and the Michigan soil management group is 1c. The primary habitat type is TTP, and the secondary habitat type is FE.

127—Gay stony muck. This very deep, poorly drained, nearly level soil is along drainageways and in swales and depressions. It is frequently ponded. Stones and small boulders are on the surface. They range from 10 to more than 50 inches in diameter and are 350 to less than 25 feet apart. Individual areas of this soil are irregularly shaped or elongated and range from 5 to 50 acres in size.

Typically, the surface layer is dark brown stony muck about 5 inches thick. The subsurface layer is light brownish gray, mottled sandy loam about 5 inches thick. The subsoil is brown and pale brown, mottled, friable sandy loam about 14 inches thick. The substratum to a depth of about 60 inches is light brown, mottled sandy loam.

Included with this soil in mapping are small areas of the somewhat poorly drained Westbury soils on low knolls and along the edges of the unit. These soils make up about 5 to 10 percent of the map unit.

Permeability is moderate in the Gay soil. The available water capacity is moderate. Surface runoff is very slow or ponded. The seasonal high water table is 1 foot above to 1 foot below the surface from fall to early summer.

This soil is used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the high water table, the use of equipment is restricted to dry summer months or to winter months when the snow cover is adequate. Year-round logging roads require fill and a gravel base. Culverts are needed to maintain the natural drainage system. The number of suitable landing sites is severely limited because of the wetness. Because of the high water table, trees on this soil are shallow rooted. Many may be blown down during periods of high winds. Swamp conifers and aspen are the dominant cover types. Clearcutting is common. After the trees are cut, competition from wetland brush can delay or prevent natural regeneration. Trees generally are not planted on this soil because of the wetness, seedling mortality, and plant competition.

This soil is generally unsuited to building site development and onsite waste disposal systems because of the ponding.

The woodland ordination symbol is 3W, the land capability classification is Vw, and the Michigan soil management group is 3c. No habitat type is assigned.

128F—Alcona-Markey complex, 0 to 50 percent slopes. This map unit consists of a very deep, very steep, well drained Alcona soil on ridges, on the side slopes of ravines, and in drainageways and a very deep, nearly level, very poorly drained Markey soil on the bottom of the ravines. The Markey soil is frequently ponded. Perennial and intermittent streams are on the bottom of the ravines. Individual areas of this unit are elongated or irregularly shaped and range from 10 to 600 acres in size. They are 60 to 80 percent Alcona soil and 15 to 30 percent Markey soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Alcona soil is covered by about 1 inch of undecomposed hardwood leaf litter. The surface layer is brown loamy very fine sand about 3 inches thick. The subsoil is about 52 inches of dark reddish brown, yellowish brown, and brownish yellow, very friable very fine sandy loam and loamy very fine sand. The substratum to a depth of about 60 inches is yellowish brown and strong brown, stratified silt, silt loam, very fine sand, and loamy very fine sand. It has thin bands of silty clay loam.

Typically, the Markey soil has a surface layer of dark reddish brown mucky peat about 3 inches thick. Below this is black, dark brown, and dark reddish brown muck about 30 inches thick. The substratum to a depth of about 60 inches is brown sand.

Included with these soils in mapping are small areas of the somewhat poorly drained Gaastra, well drained Sugar, and poorly drained Ermatinger soils. Gaastra soils are on the foot slopes of ravines and in depressions on ridgetops. Sugar soils are underlain by clay. They are in landscape positions similar to those of the Alcona soil. Ermatinger soils formed in stratified mineral material. They are in landscape positions similar to those of the Markey soil. Included soils make up about 5 to 25 percent of the map unit.

Permeability is moderate in the Alcona soil. It is moderately slow to moderately rapid in the organic part of the Markey soil and rapid in the sandy substratum. The available water capacity is moderate in the Alcona soil and high in the Markey soil. Surface runoff is medium on the Alcona soil and very slow or ponded on the Markey soil. The Markey soil has a seasonal high water table 1 foot above to 1 foot below the surface from fall to summer.

These soils are used as woodland. The major management concerns are the equipment limitation, the erosion hazard, the windthrow hazard, seedling mortality, and plant competition. Access is limited by the slope and the wet ravine bottoms. The ravine bottoms are generally too wet and narrow for logging roads.

Special care is needed in laying out logging roads and in operating equipment. Logging roads and skid trails can be located on ridgetops, if any are available, or on nearby soils that are better suited. Disturbed areas are subject to erosion. Special logging methods, such as yarding with a cable, may be needed to minimize erosion. Because of the wetness, trees on these soils are shallow rooted. Some may be blown down during periods of high winds. Northern hardwoods, aspen, and swamp conifers are the dominant cover types. The opportunities for planting are limited because of the slope. If trees are planted in the sloping areas, site preparation by mechanical or chemical means is needed to control competing vegetation.

These soils are generally unsuited to building site development and sanitary facilities because of the slope in areas of the Alcona soil and the ponding, low strength, and excess humus in areas of the Markey soil.

The woodland ordination symbols are 3R and 2W, the land capability classification is VIIe, and the Michigan soil management groups are 3a-s and M/4c. The primary habitat type is AVO, and the secondary habitat type is TTS.

129A—Rudyard silt loam, 0 to 3 percent slopes. This very deep, somewhat poorly drained, nearly level soil is on broad plains. Individual areas are irregular in shape and range from 5 to 600 acres in size.

Typically, the surface layer is very dark grayish brown silt loam about 9 inches thick. The subsoil is about 12 inches of reddish brown, mottled, firm silty clay and clay. The substratum to a depth of about 60 inches is reddish brown, mottled clay. In places it is varved or stratified with thin bands of silt loam and silty clay loam. In some areas the surface layer is fine sand.

Included with this soil in mapping are small areas of the moderately well drained Ontonagon and poorly drained Pickford soils. Ontonagon soils are on low knolls, on ridges, and on side slopes along streams and drainageways. Pickford soils are in depressions and drainageways. Included soils make up about 5 to 15 percent of the map unit.

Permeability is very slow in the Rudyard soil. The available water capacity is moderate. Surface runoff is slow. A perched seasonal high water table is at a depth of 0.5 foot to 1.5 feet from late fall to late spring. The shrink-swell potential is high.

Most areas are used as cropland or pasture. Some are used as woodland. Some areas of abandoned farmland are reverting to speckled alder and willow.

The major concerns in managing woodland are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the wetness and the sticky and plastic qualities of the subsoil, the use of equipment is restricted to dry summer months or to winter months when the snow cover is adequate. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. Culverts are needed. The use of landing sites is restricted to periods when the soil is dry or frozen. The landings should be located in the better drained areas that may be available in this map unit. They should be stabilized so that they can withstand the repeated use of heavy equipment. Selection of special planting stock, such as containerized seedlings, and special site preparation that protects the surface with thin layers of loose slash can reduce the seedling mortality rate. Because of the high water table, trees on this soil are shallow rooted. Many may be blown down during periods of high winds. The aspen cover type is dominant on this soil. Clearcutting is common. After the trees are cut, plant competition can delay natural regeneration. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is fairly well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management needs are measures that remove excess water during wet periods, maintain tilth, maintain the organic matter content, and minimize surface compaction. Shallow surface ditches can help to remove excess water if adequate outlets are available. Erosion-control structures may be needed where surface ditches enter outlet drainageways. When the soil is wet, ruts form easily and the load-bearing capacity is low. Tilling when the soil is at the proper moisture content helps to minimize surface compaction and maintain good soil structure. Returning crop residue to the soil, adding organic material, and applying a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface can improve tilth and increase the organic matter content.

This soil is well suited to pasture and hay. Overgrazing or grazing when the soil is wet causes surface compaction and destroys forage plants. The forage species that can tolerate wetness, such as trefoil-grass mixtures, should be selected for planting. Proper stocking rates, rotation grazing, and restricted grazing during wet periods help to keep the pasture in good condition.

This soil is poorly suited to building site development because of the wetness and the high shrink-swell potential. It is generally unsuited to septic tank absorption fields because of the wetness and the restricted permeability. It is well suited to sewage lagoons. On sites for buildings, the foundation trench should be widened and backfilled with suitable coarse textured material, which reduces the shrink-swell potential. The building site should be raised, and a drainage system should be installed to remove excess water.

The woodland ordination symbol is 6W, the land capability classification is IIIw, and the Michigan soil management group is 0b. The primary habitat type is TTP.

130A—Rudyard-Pickford silty clay loams, 0 to 3 percent slopes. This map unit consists of very deep, nearly level, somewhat poorly drained Rudyard and poorly drained Pickford soils on broad plains. The Pickford soil is in slight depressions and is subject to ponding. Individual areas of this unit are irregular in shape and range from 5 to 700 acres in size. They are 40 to 60 percent Rudyard soil and 30 to 50 percent Pickford soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Rudyard soil has a surface layer of brown silty clay loam about 6 inches thick. The subsoil is about 11 inches thick. It is mottled and firm. The upper part is brown and gray silty clay loam and silt loam, and the lower part is reddish brown clay. The substratum to a depth of about 60 inches is reddish brown, mottled clay. In places it is varved or stratified with thin bands of silt loam and silty clay loam.

Typically, the Pickford soil has a surface layer of very dark gray silty clay loam about 8 inches thick. The subsurface layer is dark gray, mottled silty clay loam about 2 inches thick. The subsoil is about 14 inches of weak red, mottled, firm and very firm silty clay and clay. The substratum to a depth of about 60 inches is reddish brown, mottled clay. In places it is varved or stratified with thin bands of silt loam and silty clay loam.

Included with these soils in mapping are small areas of the moderately well drained Ontonagon soils on low knolls, on ridges, and on side slopes along streams and drainageways. These included soils make up about 5 to 10 percent of the map unit.

Permeability is very slow in the Rudyard and Pickford soils, and the available water capacity is moderate. Surface runoff is slow on the Rudyard soil and very slow or ponded on the Pickford soil. From fall to late spring, the Rudyard soil has a perched seasonal high water table at a depth of 0.5 foot to 1.5 feet and the Pickford soil has one 1 foot above to 1 foot below the surface. The shrink-swell potential is high in the Rudyard soil and moderate in the Pickford soil.

Most areas are used as cropland or pasture. Some are used as woodland. Some areas of abandoned farmland are reverting to speckled alder and willow.

The major concerns in managing woodland are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the high water table and the sticky and plastic qualities of the subsoil, the use of equipment is restricted to dry summer months or to winter months when the snow cover is adequate. When the soils are wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. Culverts are needed. The use of landings is limited to periods when the soils are dry or frozen. The landings should be located in the better drained areas that may be available in this unit. Selection of special planting stock, such as containerized seedlings, and special site preparation that protects the surface with thin layers of loose slash can reduce the seedling mortality rate. Because of the high water table, trees on these soils are shallow rooted. Some may be blown down during periods of high winds. The aspen cover type is dominant on these soils. Clearcutting is common. After the trees are cut, plant competition can delay or prevent natural regeneration. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

These soils are fairly well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management needs are measures that remove excess water during wet periods, maintain tilth, and minimize surface compaction. In low areas these soils pond after heavy rains or spring snowmelt. Shallow surface ditches can help to remove excess water if outlets are available. Erosion-control structures may be needed where surface ditches enter drainageways. Working the soils when they are wet results in surface compaction and the formation of clods. Returning crop residue to the soil, planting small grain crops, adding organic material, and applying a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface can improve tilth and minimize surface compaction.

These soils are well suited to pasture and hay. Overgrazing or grazing when the soils are wet can cause surface compaction and destroy forage plants. The forage species that can tolerate wetness, such as trefoil-grass mixtures, should be selected for planting. Proper stocking rates, rotation grazing, and restricted grazing during wet periods help to keep the pasture in good condition.

These soils are poorly suited to building site development because of the wetness, the ponding, and the shrink-swell potential. They are generally unsuited to septic tank absorption fields because of the wetness and the restricted permeability. The Rudyard soil is well suited to sewage lagoons, but the Pickford soil is poorly suited. It is well suited, however, if the excavation site is properly banked and the lagoon is sealed. Building sites should be raised, and a drainage system should be installed to remove excess water. Widening the foundation trench and backfilling with suitable coarse textured material help to prevent the structural damage caused by shrinking and swelling.

The woodland ordination symbol is 6W, the land capability classification is IIIw, and the Michigan soil management groups are 0b and 1c. The primary habitat type is TTP.

132B—Sugar very fine sandy loam, 0 to 6 percent slopes. This very deep, moderately well drained, nearly level and undulating soil is on broad plains. Individual areas are irregularly shaped or elongated and range from 5 to 100 acres in size.

Typically, the surface is covered by about 1 inch of black, well decomposed forest litter. The surface layer is black very fine sandy loam about 3 inches thick. The subsurface layer is pinkish gray loamy very fine sand about 7 inches thick. The subsoil is about 35 inches thick. The upper part is dark brown and strong brown, firm very fine sandy loam; the next part is yellowish brown and light brown, mottled, firm loamy very fine sand; and the lower part is reddish brown and white, mottled, firm, stratified silt loam, loamy very fine sand, and silty clay loam. The substratum to a depth of about 60 inches is reddish brown and light reddish brown, stratified silt loam and clay.

Included with this soil in mapping are small areas of the moderately well drained Ontonagon and somewhat poorly drained Biscuit soils. Ontonagon soils are clayey throughout. They are in landscape positions similar to those of the Sugar soil. Biscuit soils are in depressions. Included soils make up about 5 to 15 percent of the map unit.

Permeability is moderate in the loamy upper part of the Sugar soil and very slow in the clayey lower part. The available water capacity is moderate. Surface runoff is slow. A perched seasonal high water table is at a depth of 1 to 4 feet from late fall to late spring.

Most areas are used as woodland. The major management concerns are the equipment limitation, the windthrow hazard, and plant competition. Trafficability is briefly limited in spring and fall and in other excessively wet periods. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Deep ruts tend to restrict lateral drainage, expose tree roots, and alter soil structure. Year-round logging roads should be graveled. Because of the seasonal high water table, trees on this soil are shallow rooted. Some may be blown down during periods of high winds. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management needs are measures that control water erosion and help to control soil blowing. Examples are small grain crops, grassed waterways, and a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface.

This soil is well suited to pasture. Overgrazing or grazing when the soil is wet causes surface compaction, destroys forage plants, and increases the susceptibility to erosion. Proper stocking rates, pasture rotation, and restricted use during wet periods help to keep the pasture in good condition.

This soil is poorly suited to building site development because of the wetness. A high shrink-swell potential also is a limitation on sites for buildings with basements. The soil is poorly suited to septic tank absorption fields because of the wetness and the very slow permeability in the lower part of the profile. It is only fairly well suited to sewage lagoons because of the slope and seepage. On sites for buildings, the foundation trench should be widened and backfilled with suitable coarse textured material, which reduces the shrink-swell potential. The building site should be raised, and a drainage system should be installed to remove excess water. Lagoons should be sealed and banked, installed on fill material, and artificially drained.

The woodland ordination symbol is 3L, the land capability classification is IIe, and the Michigan soil management group is 3/1a. The primary habitat type is ATD, and the secondary habitat type is AVO.

132F—Sugar very fine sandy loam, 25 to 50 percent slopes. This very deep, well drained, steep and very steep soil is on the sides of ridges, on uplands, and in ravines. Many areas are dissected with shallow intermittent drainageways. Individual areas are elongated and range from 5 to 250 acres in size.

Typically, the surface is covered by about 1 inch of black, well decomposed forest litter. The surface layer is black very fine sandy loam about 3 inches thick. The subsurface layer is pinkish gray loamy very fine sand about 7 inches thick. The subsoil is about 35 inches thick. The upper part is dark brown and strong brown, firm very fine sandy loam; the next part is yellowish brown and light brown, firm loamy very fine sand; and the lower part is reddish brown and white, firm, stratified silt loam, loamy very fine sand, and silty clay loam. The substratum to a depth of about 60 inches is reddish brown and light reddish brown, stratified silt loam and clay.

Included with this soil in mapping are small areas of the well drained Ontonagon soils. These soils are in landscape positions similar to those of the Sugar soil. They are clayey throughout. They make up about 5 to 10 percent of the map unit.

Permeability is moderate in the loamy upper part of the Sugar soil and very slow in the clayey lower part. The available water capacity is moderate. Surface runoff is rapid.

This soil is used as woodland. The major management concerns are the equipment limitation, the erosion hazard, and plant competition. Access is limited by the slope. Special care is needed in laying out logging roads and in operating equipment. The roads can be designed so that they conform to the natural slope of the land. Special logging methods, such as yarding with a cable, may be needed to minimize surface disturbance. Erosion can result from the concentration of runoff on roads, in the tracks of wheeled equipment, and on landings. Removing water with water bars, out-sloping road surfaces, culverts, and drop structures minimizes erosion. Landings should be located in the less sloping nearby areas. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting. After the overstory is removed, plant competition is moderate.

This soil is generally unsuited to building site development, septic tank absorption fields, and sewage lagoons because of the slope.

The woodland ordination symbol is 3R, the land capability classification is VIIe, and the Michigan soil management group is 3/1a. The primary habitat type is ATD, and the secondary habitat type is AVO.

133—Dora muck. This very deep, very poorly drained, nearly level soil is in depressions and drainageways. It is frequently ponded. Individual areas are elongated or irregularly shaped and range from 5 to 400 acres in size.

Typically, the surface layer is black muck about 12 inches thick. Below this is about 13 inches of very dark gray muck and dark reddish brown mucky peat. The substratum to a depth of about 60 inches is gray and reddish brown, mottled silty clay loam and silty clay. In places the soil has less than 16 inches of muck.

Included with this soil in mapping are small areas of Carbondale soils. These soils are in landscape positions similar to those of the Dora soil. They formed in more than 51 inches of organic material. They make up about 5 to 15 percent of the map unit.

Permeability is moderate or moderately rapid in the organic layers of the Dora soil and very slow in the clayey substratum. The available water capacity is high. Surface runoff is very slow or ponded. The water table is 1 foot above to 1 foot below the surface from fall to summer and seldom drops below a depth of 1 foot.

This soil is used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the wetness and the instability of the muck, trees can be logged only during periods in winter when logging roads are frozen. The swamp conifer cover type is dominant on this soil. Clearcutting and stripcutting are common. After the trees are cut, competition from wetland brush can be expected to delay or prevent natural regeneration. Because of the wetness, the trees are shallow rooted. Many may be blown down during periods of high winds. Trees generally are not planted on this soil because of severe seedling mortality, the wetness, and severe plant competition.

This soil is generally unsuited to building site development because of the ponding, low strength, and a high shrink-swell potential. It is generally unsuited to septic tank absorption fields because of the ponding, excess humus, and the restricted permeability and to sewage lagoons because of seepage, the ponding, and excess humus.

The woodland ordination symbol is 3W, the land capability classification is VIw, and the Michigan soil management group is M/1c. No habitat type is assigned.

135B—Longrie-Posen complex, 0 to 6 percent slopes. This map unit consists of nearly level and undulating, well drained, moderately deep Longrie and deep Posen soils on broad plains and ridgetops. Stones and small boulders are on the surface. They range from 10 to more than 50 inches in diameter and are 350 to less than 25 feet apart. Individual areas of this unit are irregular in shape and range from 20 to 500 acres in size. They are 40 to 55 percent Longrie soil and 40 to 50 percent Posen soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Longrie soil has a surface layer of black sandy loam about 4 inches thick. The subsurface layer is reddish gray sandy loam about 5 inches thick. The subsoil is dark reddish brown and reddish brown, friable fine sandy loam about 18 inches thick. The substratum is light brown gravelly loam about 4 inches thick. Limestone bedrock is at a depth of about 31 inches. In places the surface layer is fine sandy loam, loam, or silt loam.

Typically, the Posen soil is covered by about 1 inch of partially decomposed leaf litter. The surface layer is very dark gray cobbly fine sandy loam about 3 inches thick. The subsoil is dark brown and brown, friable very cobbly silt loam about 13 inches thick. The substratum to a depth of about 60 inches is brown very gravelly fine sandy loam. In places the surface layer is the gravelly or cobbly analogs of loam or silt loam or gravelly fine sandy loam.

Included with these soils in mapping are small areas of the somewhat poorly drained Ensign and Shelter soils in the slightly lower landscape positions. Also included are scattered small areas of rock outcrop. Included areas make up about 5 to 10 percent of the map unit.

Permeability is moderate in the Longrie and Posen soils. The available water capacity is low in the Longrie soil and moderate in the Posen soil. Surface runoff is slow.

Most areas are used as woodland. The major management concerns are the equipment limitation, the windthrow hazard, and plant competition. The bedrock may interfere with road construction. Trafficability is briefly limited in spring and in other excessively wet periods. When the soils are wet, unsurfaced logging roads are slippery and ruts form easily. Deep ruts tend to restrict lateral drainage, expose tree roots, and alter soil structure. Large stones on the surface can hinder harvesting and can result in equipment damage. Year-round logging roads should be graveled. Culverts are needed to maintain the natural drainage system. Because of the moderate depth to bedrock, trees on the Longrie soil are shallow rooted. Some may be blown down during periods of high winds. The northern hardwoods cover type is dominant on these soils. Species preference can be managed by selective cutting. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

The Longrie soil is fairly well suited to building site development, but the depth to bedrock is a limitation on sites for buildings with basements. The Posen soil is poorly suited to building site development because of the content of coarse fragments. The soils are poorly suited to septic tank absorption fields because of the depth to bedrock in the Longrie soil and the coarse fragments in the Posen soil. If a septic tank disposal system is installed, mounding the absorption field with suitable material can raise the site above the bedrock. Also, the coarse fragments in the Posen soil should be removed. The soils are generally unsuited to sewage lagoons because of seepage and the depth to bedrock.

The woodland ordination symbols are 2D and 2X, the land capability classification is IIe, and the Michigan soil management groups are 3/Ra and 3a. The primary habitat type is AVO.

136A—Westbury-Gay complex, 0 to 3 percent slopes. This map unit consists of a very deep, nearly level, somewhat poorly drained Westbury soil on low knolls and low, broad plains and a very deep, nearly level, poorly drained Gay soil in depressions, swales, and drainageways. The Gay soil is frequently ponded. Stones and small boulders are on the surface. They range from 10 to more than 50 inches in diameter and are 350 to less than 25 feet apart. Individual areas of this unit are irregular in shape and range from 5 to 500 acres in size. They are 40 to 55 percent Westbury soil and 40 to 50 percent Gay soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Westbury soil is covered by about 3 inches of very dark gray and black leaf litter. The surface is reddish gray, stony fine sandy loam about 1 inch thick. The subsoil is about 44 inches thick. It is mottled. The upper part is dark brown and dark yellowish brown, friable cobbly silt loam and gravelly fine sandy loam. The lower part is light brown and brown, very firm very gravelly sandy loam. The substratum to a depth of about 60 inches is light brown, mottled very gravelly sandy loam.

Typically, the Gay soil has a surface layer of dark brown stony muck about 5 inches thick. The subsurface layer is light brownish gray, mottled sandy loam about 5 inches thick. The subsoil is brown and pale brown, mottled, friable sandy loam about 14 inches thick. The substratum to a depth of about 60 inches is light brown, mottled sandy loam.

Included with these soils in mapping are small areas of the poorly drained Pickford and moderately well drained Oldman and Velvet soils. Pickford soils are clayey throughout. They are in landscape positions similar to those of the Westbury and Gay soils. Oldman and Velvet soils are in the higher landscape positions. Included soils make up about 10 to 15 percent of the map unit.

Permeability is very slow in the dense, firm, middle part of the Westbury soil and moderate in the rest of the profile. It is moderate in the Gay soil. The available water capacity is low in the Westbury soil and moderate in the Gay soil. Surface runoff is slow on the Westbury soil and very slow or ponded on the Gay soil. From late fall to late spring, the Westbury soil has a perched seasonal high water table at a depth of 0.5 foot to 1.5 feet and the Gay soil has one 1.0 foot above to 0.5 foot below the surface. The potential for frost action is high in the Gay soil.

These soils are used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. The use of equipment is limited by the wetness and the stoniness. Equipment should be used only during dry summer months or during winter months when the snow cover is adequate. Year-round logging roads require fill and a gravel base. Culverts are needed to maintain the natural drainage system. Landings can be used only when the soils are dry or frozen. Because of the dense, firm layer in the Westbury soil and the wetness, trees are shallow rooted. Some may be blown down during periods of high winds. Swamp conifers and aspen are the dominant cover types. Clearcutting is common. After the trees are cut, competition from wetland brush can delay or prevent natural regeneration. The opportunities for planting are limited because of the wetness, the stones on the surface, severe seedling mortality, and plant competition. If seedlings are planted, selection of special planting stock, such as containerized seedlings, and special site preparation that protects the surface with thin layers of loose slash can reduce the seedling mortality rate. Furrowing before planting also can increase the seedling survival rate. After the overstory has been removed, plant competition can be controlled by mechanical or chemical means.

These soils are generally unsuited to building site development and onsite waste disposal systems because of the ponding and the stoniness.

The woodland ordination symbols are 3W and 6W, the land capability classification is VIIs, and the Michigan soil management groups are Gbc and 3c. No habitat type is assigned.

137A—Kinross-Wainola complex, 0 to 3 percent slopes. This map unit consists of very deep, nearly level, poorly drained Kinross and somewhat poorly drained Wainola soils on low ridges and in swales. The Kinross soil is frequently ponded. Individual areas of this unit are irregular in shape and range from 10 to 1,000 acres in size. They are 50 to 70 percent Kinross soil and 25 to 50 percent Wainola soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Kinross soil has a surface layer of black muck about 3 inches thick. The subsurface layer is dark gray fine sand about 7 inches thick. The subsoil is dark brown and brown, mottled, very friable and loose fine sand about 15 inches thick. The substratum to a depth of about 60 inches is brown fine sand.

Typically, the Wainola soil is covered by about 3 inches of partially decomposed leaf litter. The subsurface layer is grayish brown fine sand about 5 inches thick. The subsoil is dark reddish brown, strong brown, and yellowish brown, mottled, friable fine sand about 19 inches thick. The substratum to a depth of about 60 inches is brown fine sand.

Included with these soils in mapping are small areas of the very poorly drained Dawson and moderately well drained Rousseau soils. Dawson soils have 16 to 50 inches of organic material. They are in the lowest positions on the landscape. Rousseau soils are on the higher knobs and ridges. Included soils make up about 5 to 15 percent of the map unit.

Permeability is rapid in the Kinross and Wainola soils, and the available water capacity is low. Surface runoff is slow on the Wainola soil and very slow or ponded on the Kinross soil. The Kinross soil has a seasonal high water table 1 foot above to 1 foot below the surface from fall to early summer. The Wainola soil has one at a depth of 0.5 foot to 1.5 feet from late fall to late spring.

These soils are used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Access is limited to dry summer months or to winter months when the snow cover is adequate. Year-round logging roads require fill and a gravel base. Culverts are needed to maintain natural drainage systems. The number of suitable landing sites is severely limited. The landings can be used only during periods when the ground is frozen. Because of the wetness, trees on these soils are shallow rooted. Many may be blown down during periods of high winds. Aspen and swamp conifers are the dominant cover types. Clearcutting and stripcutting are common. After the trees are cut, competition from wetland brush can delay or prevent natural regeneration. The opportunities for planting are limited because of the wetness, seedling mortality, and plant competition. If seedlings are planted, selection of special planting stock, such as containerized seedlings, and special site preparation that protects the surface with thin layers of loose slash can reduce the seedling mortality rate. Furrowing before planting also can increase the seedling survival rate. After the overstory has been removed, plant competition can be controlled by mechanical or chemical means.

These soils are poorly suited to building site development because of the ponding in areas of the Kinross soil and the wetness in areas of the Au Gres soil. They are generally unsuited to septic tank absorption fields because of the wetness and a poor filtering capacity. They are generally unsuited to sewage lagoons because of seepage and the wetness.

The woodland ordination symbols are 2W and 6W, the land capability classification is VIw, and the Michigan soil management groups are 5c and 5b. The primary habitat type is TTS, and the secondary habitat type is TMC.

138B—Rousseau, dark subsoil-Urban land complex, 0 to 4 percent slopes. This map unit consists of Urban land and a very deep, nearly level and undulating, well drained Rousseau soil on broad flats. Individual areas are irregular in shape and are about 1,800 acres in size. They are 45 to 65 percent Rousseau soil and 20 to 40 percent Urban land. The Rousseau soil and Urban land occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Rousseau soil has a surface layer of black fine sand about 2 inches thick. The subsurface layer is reddish gray fine sand about 3 inches thick. The subsoil is dark reddish brown and strong brown, very friable fine sand about 15 inches thick. The substratum to a depth of about 60 inches is brown and light brown fine sand. In places part or all of the soil is sand.

The Urban land is covered by streets, parking lots, runways, buildings, and other structures that so obscure or alter the soils that identification of the soil series is not feasible. Some areas have been filled, leveled, built up, or cut during construction.

Permeability is rapid in the Rousseau soil. The available water capacity is low. Surface runoff is slow.

The Rousseau soil is in areas where lawns or gardens are established and in other parts of the unit. It is fairly well suited to lawns, gardens, most recreational uses, and most kinds of building site development. Droughtiness is a limitation affecting lawns, gardens, and trees. Regular additions of water during dry periods can overcome this limitation. Adding peat or topsoil can increase the available water capacity.

The Rousseau soil is poorly suited to septic tank absorption fields because of a poor filtering capacity. It readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. Sanitary facilities should be connected to commercial sewers and treatment plants.

No interpretive groups are assigned.

139A—Rudyard-Urban land complex, 0 to 3 percent slopes. This map unit consists of Urban land and a very deep, nearly level, somewhat poorly drained Rudyard soil on broad flats. Individual areas are irregular in shape and range from 100 to 1,000 acres in size. They are 40 to 65 percent Rudyard soil and 30 to 50 percent Urban land. The Rudyard soil and Urban land occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Rudyard soil has a surface layer of brown, silty clay loam about 6 inches thick. The subsoil is about 11 inches thick. It is mottled and firm. The upper part is brown and gray silty clay loam and silt loam, and the lower part is reddish brown clay. The substratum to a depth of about 60 inches is reddish brown, mottled clay. In places it is varved or stratified with thin bands of silt loam or silty clay loam.

The Urban land is covered by streets, parking lots, buildings, and other structures that so obscure or alter the soils that identification of the soil series is not feasible. Some areas have been filled, leveled, built up, or cut during construction.

Included with this unit in mapping are small areas of the somewhat poorly drained Allendale soils. These soils are in landscape positions similar to those of the Rudyard soil. They have a sandy surface layer and subsoil. Also included are small areas of the poorly drained Pickford soils in depressions and drainageways. Included soils make up about 5 to 20 percent of the map unit.

Permeability is very slow in the Rudyard soil. The available water capacity is moderate. Surface runoff is slow. A perched seasonal high water table is at a depth of 0.5 foot to 1.5 feet from late fall to late spring. The shrink-swell potential is high.

The Rudyard soil is in areas where lawns or gardens are established and in other parts of the unit. Because of the wetness and the very slow permeability, it is generally unsuited to septic tank absorption fields. It is poorly suited to building site development because of the wetness and the shrink-swell potential. A surface or subsurface drainage system is needed. Buildings without basements can be constructed on well compacted fill material, which can raise the level of the site above the perched seasonal high water table. Widening the foundation trench and backfilling with suitable coarse textured material reduce the shrink-swell potential. Subsurface drains can be installed around the foundation if outlets are available. Low strength and frost action are limitations on sites for local roads and streets. These limitations can be overcome by replacing or covering the upper layer of the soil with suitable base material. Sanitary facilities should be connected to commercial sewers and treatment plants.

No interpretive groups are assigned.

143—Burleigh loamy fine sand. This very deep, poorly drained, nearly level soil is on low, broad plains. It is frequently ponded. Individual areas range from 15 to 1,500 acres in size.

Typically, the surface layer is very dark gray loamy fine sand about 7 inches thick. The substratum is mottled. The upper part is dark gray loamy fine sand about 6 inches thick; the next part is yellowish brown fine sand about 8 inches thick; and the lower part to a depth of about 60 inches is light brownish gray and light brown, stratified fine sand, very fine sand, and silt loam. In some places mucky layers are in the lower part of the substratum. In other places the surface layer is fine sand.

Included with this soil in mapping are small areas of the somewhat poorly drained Ingalls and poorly drained Ermatinger soils. Ingalls soils are on low ridges. Ermatinger soils are finer textured throughout than the Burleigh soil. They are in landscape positions similar to those of the Burleigh soil. Included soils make up about 5 to 10 percent of the map unit.

Permeability is rapid in the upper part of the Burleigh soil and moderately slow in the stratified lower part. The available water capacity is moderate. Surface runoff is very slow or ponded. The seasonal high water table is 1 foot above to 1 foot below the surface from fall to early summer.

Most areas are used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the high water table, the use of equipment is restricted to dry summer months or to winter months when the snow cover is adequate. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Year-round logging roads should be graveled. Culverts are needed. The number of suitable landing sites is severely limited because of the wetness. Because of the wetness, trees on this soil are shallow rooted. Many may be blown down during periods of high winds and excessive wetness. The aspen cover type is dominant on this soil. Clearcutting is common. After the trees are cut, competition from wetland brush can delay or prevent natural regeneration. Trees generally are not planted on this soil because of the wetness, severe seedling mortality, and plant competition.

This soil is generally unsuited to building site development because of the ponding. It is generally unsuited to septic tank absorption fields because of the ponding, the restricted permeability, and a poor filtering capacity and to sewage lagoons because of seepage and the ponding.

The woodland ordination symbol is 2W, the land capability classification is Vw, and the Michigan soil management group is 4/2c. No habitat type is assigned.

144—Urban Land-Udorthents complex, nearly level. This map unit consists of Urban land and nearly level, moderately well drained to poorly drained soils in areas where the landscape has been disturbed. It is within the city limits of Sault Ste. Marie. Individual areas are irregular in shape and range from 350 to 1,500 acres in size. They are 60 to 75 percent Urban land and 20 to 40 percent Udorthents. The Urban land and Udorthents occur as areas so intricately mixed or so small that mapping them separately is not practical.

The Urban land is covered by streets, parking lots, buildings, and other structures that so obscure or alter the soils that identification of the soil series is not practical. Some areas are shallow over sandstone bedrock or consist of dredged bedrock at the surface.

The Udorthents vary greatly in texture and drainage. The original soil material has been removed, mixed, or covered with fill.

Included with this unit in mapping are small areas of the poorly drained Ermatinger and somewhat poorly drained Wega and Rudyard soils. Ermatinger and Wega soils are stratified, loamy soils. Rudyard soils are clayey throughout. Included soils make up about 5 to 15 percent of the map unit.

The areas of Udorthents are used for building site development or are idle land. Onsite investigation is necessary to determine the suitability of these soils for specific uses.

No interpretive groups are assigned.

145A—Gaastra-Gogomain-Ingalls complex, 0 to 3 percent slopes. This map unit consists of very deep, nearly level, somewhat poorly drained Gaastra and Ingalls and poorly drained Gogomain soils. The Gaastra and Ingalls soils are on broad plains, low ridges, and low knolls. The Gogomain soil is in depressions and drainageways. It is frequently ponded. Individual areas of this unit are irregular in shape and range from 15 to 1,200 acres in size. They are 35 to 50 percent Gaastra soil, 25 to 40 percent Gogomain soil, and 15 to 30 percent Ingalls soil. The three soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Gaastra soil is covered by about 2 inches of well decomposed leaf litter and live roots. The surface layer is brown and pinkish gray, mottled silt loam about 8 inches thick. The subsoil is about 33 inches thick. It is mottled and friable. The upper part is reddish brown and strong brown very fine sandy loam, the next part is light reddish brown loamy very fine sand, and the lower part is reddish brown and light reddish brown very fine sandy loam. The substratum to a depth of about 60 inches is light reddish brown and reddish brown, mottled, stratified very fine sandy loam, loamy very fine sand, and fine sand.

Typically, the Gogomain soil has a surface layer of black very fine sandy loam about 6 inches thick. The subsoil is about 31 inches thick. It is mottled and very friable. The upper part is grayish brown and pale brown very fine sandy loam and loamy very fine sand, and the lower part is brown very fine sand. The substratum to a depth of about 60 inches is light reddish brown and pinkish gray, mottled clay. In some places the upper part of the soil is loamy sand. In other places the surface layer is loamy very fine sand or silt loam.

Typically, the Ingalls soil is covered by about 3 inches of leaf litter. The surface layer is brown loamy sand about 7 inches thick. The subsoil is about 33 inches thick. It is mottled. The upper part is dark brown, friable loamy sand and sand, and the lower part is brown, very friable loamy fine sand. The substratum to a depth of about 60 inches is dark yellowish brown, mottled, stratified loamy fine sand and silt loam.

Included with these soils in mapping are small areas of the very poorly drained Markey and poorly drained Pickford soils. These included soils are in landscape positions similar to those of the Gogomain soil. Markey soils formed in organic material 16 to 50 inches deep over sand and fine sand. Pickford soils are clayey throughout. Also included are small areas of the moderately well drained Alcona soils on knolls and ridges. Included soils make up about 5 to 25 percent of the map unit.

Permeability is moderately slow in the Gaastra soil. It is moderately rapid in the loamy upper part of the Gogomain soil and very slow in the clayey substratum. It is rapid in the upper part of the Ingalls soil and moderately slow in the stratified lower part. The available water capacity is high in the Gaastra soil and moderate in the Gogomain and Ingalls soils. Surface runoff is slow on the Gaastra and Ingalls soils and very slow or ponded on the Gogomain soil. From late fall to late spring, the Gaastra soil has a seasonal high water table at a depth of 1 to 2 feet, the Gogomain soil has one 1 foot above to 1 foot below the surface, and the Ingalls soil has one at a depth of 0.5 to 1.0 foot.

These soils are used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the high water table, the use of equipment is restricted to dry summer months or to winter months when the snow cover is adequate. When the soils are wet, unsurfaced logging roads are slippery and ruts form easily. Deep ruts tend to restrict lateral drainage, expose tree roots, and alter soil structure. Year-round logging roads should be graveled. Culverts are needed. The number of suitable landing sites is severely limited because of the wetness. Because of the wetness, trees on these soils are shallow rooted. Some may be blown down during periods of high winds. The aspen cover type is dominant on these soils. Some small areas support swamp conifers. Clearcutting is common. After the trees are cut, competition from wetland brush can delay or prevent natural regeneration. Selection of special planting stock, such as containerized seedlings, and special site preparation that protects the surface with thin layers of loose slash can reduce the seedling mortality rate in the better drained areas. After the overstory has been removed, site preparation by mechanical or chemical means is needed to control competing vegetation.

Because of the wetness, these soils are poorly suited or unsuited to building site development. They are generally unsuited to septic tank absorption fields because of the wetness, the ponding, the restricted permeability, and seepage and to sewage lagoons because of the wetness, the ponding, and seepage.

The woodland ordination symbol is 3W for the Gaastra soil and 4W for the Gogomain and Ingalls soils; the land capability classification is IIw; and the Michigan soil management groups are 2.5b, 3/1c, and 4/2b. The primary habitat type is TMC-D.

146A—Allendale-Fibre complex, 0 to 3 percent slopes. This map unit consists of very deep, nearly level, somewhat poorly drained Allendale and poorly drained Fibre soils. The Allendale soil is on low knolls and ridges. The Fibre soil is in slight depressions and on low flats. It is frequently ponded. Individual areas of this unit are irregular in shape and range from 20 to 200 acres in size. They are 30 to 60 percent Allendale soil and 30 to 50 percent Fibre soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Allendale soil has a surface layer of black loamy fine sand about 5 inches thick. The subsurface layer is pinkish gray fine sand about 3 inches thick. The subsoil is about 27 inches thick. The upper part is dark reddish brown, very friable loamy fine sand; the next part is strong brown and yellowish brown, mottled, very friable fine sand; and the lower part is reddish brown, mottled, firm silty clay. The substratum to a depth of about 60 inches is light reddish brown, mottled silty clay that has thin strata of yellowish brown silty clay loam and silt loam. In places the surface layer is fine sand or loamy sand.

Typically, the Fibre soil has a surface layer of black muck about 5 inches thick. The subsurface layer is brown sand about 8 inches thick. The subsoil is about 14 inches thick. It is mottled. The upper part is dark brown and reddish brown, very friable loamy sand and sandy loam, and the lower part is reddish brown, firm clay. The substratum to a depth of about 60 inches is reddish brown, mottled clay that has thin bands of pinkish gray silt.

Included with these soils in mapping are small areas of the somewhat poorly drained Rudyard, poorly drained Pickford, and very poorly drained Markey soils. Rudyard and Pickford soils have a clayey surface layer. Rudyard soils are in landscape positions similar to those of the Allendale soil. Pickford soils are in landscape positions similar to those of the Fibre soil. Markey soils have 16 to 51 inches of organic material over sand. They are in depressions or drainageways. Included soils make up about 5 to 15 percent of the map unit.

Permeability is moderately rapid and rapid in the sandy upper part of the Allendale and Fibre soils and very slow in the clayey lower part. The available water capacity is moderate in both soils. Surface runoff is slow on the Allendale soil and very slow or ponded on the Fibre soil. The Allendale soil has a perched seasonal high water table at a depth of 0.5 foot to 1.5 feet from late fall to late spring, and the Fibre soil has one 1 foot above to 1 foot below the surface from fall to late spring.

These soils are used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the high water table, the use of equipment is restricted to dry summer months or to winter months when the snow cover is adequate. Year-round logging roads should be graveled. Culverts are needed. Landings can be used only when the soils are dry or frozen. Because of the high water table, trees on these soils are shallow rooted. Some may be blown down during periods of high winds. The aspen cover type is dominant on these soils. The mortality of planted seedlings can be expected because of the wetness. Selection of special planting stock, such as containerized seedlings, and special site preparation that protects the surface with thin layers of loose slash can reduce the seedling mortality rate. If trees are planted in the better drained areas, site preparation by mechanical or chemical means is needed to control competing vegetation.

Because of the ponding and a high shrink-swell potential, the Allendale soil is poorly suited to building site development and the Fibre soil is generally unsuited. Both soils are generally unsuited to septic tank absorption fields because of the wetness, the ponding, a poor filtering capacity in the sandy upper part of the profile, and the very slow permeability in the clayey lower part. They are generally unsuited to sewage lagoons because of seepage, excess humus, and the ponding.

The woodland ordination symbols are 4W and 3W, the land capability classification is IIIw, and the Michigan soil management groups are 4/1b and 4/1c. The primary habitat type is TMC-D.

147B—Shelter very stony loam, 0 to 6 percent slopes. This very deep, somewhat poorly drained, nearly level and undulating soil is on low ridges and broad plains. Stones and small boulders are on the surface. They range from 10 to 50 inches in diameter and are 350 to less than 25 feet apart. Individual areas of this soil are irregular in shape and range from 5 to more than 2,000 acres in size.

Typically, the surface layer is black, very stony loam about 4 inches thick. The next layer is very dark gray and dark brown very stony loam about 2 inches thick. The subsoil is light yellowish brown, mottled, friable very cobbly fine sandy loam about 6 inches thick. The substratum to a depth of about 60 inches is light brownish gray, mottled, very cobbly fine sandy loam. In some places limestone bedrock is at a depth of about 40 to 60 inches. In other places the surface layer is the cobbly, gravelly, very cobbly, or very gravelly analogs of fine sandy loam or silt loam or cobbly, gravelly, or very gravelly loam.

Included with this soil in mapping are small areas of the excessively drained Alpena, somewhat poorly drained Ensign, and poorly drained Beavertail soils. Alpena soils are sandier throughout than the Shelter soil. They are in landscape positions similar to those of the Shelter soil or are on ridges. Ensign soils are underlain by limestone bedrock within a depth of 40 inches. They are in landscape positions similar to those of the Shelter soil or are slightly lower on the landscape. Beavertail soils are in depressions. Also included, along lakeshores, are small areas of extremely stony or bouldery Shelter soils. Included soils make up about 5 to 15 percent of the map unit.

Permeability is very slow in the Shelter soil. The available water capacity is low. Surface runoff is slow. A perched seasonal high water table is at a depth of 0.5 to 1.0 foot from fall to late spring.

Most areas are used as woodland. The major management concerns are the equipment limitation, the windthrow hazard, and plant competition. Equipment should be used only during dry summer months or during winter months when the snow cover is adequate. During wet periods, the surface layer and subsoil become saturated and unsurfaced logging roads are slippery. Year-round logging roads require a gravel base. Culverts are needed to maintain the natural drainage system. Landings generally can be used only during the driest part of the year. Large stones on the surface can hinder harvesting and can result in equipment damage. Because of the firm substratum and the wetness, trees on this soil are shallow rooted. Some may be blown down during periods of high winds. Swamp conifers and aspen are the dominant cover types. Trees generally are not planted on this soil because of the large number of stones on the surface and the wetness.

This soil is generally unsuited to building site development because of the wetness and the stoniness. It is generally unsuited to septic tank absorption fields because of the wetness, the stoniness, and the restricted permeability and to sewage lagoons because of the stoniness.

The woodland ordination symbol is 4X, the land capability classification is VIw, and the Michigan soil management group is Gbc. No habitat type is assigned.

147D—Shelter very stony loam, 6 to 15 percent slopes. This very deep, somewhat poorly drained, gently rolling and rolling soil is on side slopes, ridges, and knolls. Stones and small boulders are on the surface. They range from 10 to more than 50 inches in diameter and are 350 to less than 25 feet apart. Individual areas of this soil are elongated or irregularly shaped and range from 5 to 80 acres in size.

Typically, the surface layer is black very stony loam about 4 inches thick. The next layer is very dark gray and dark brown very stony loam about 2 inches thick. The subsoil is light yellowish brown, mottled, friable very cobbly fine sandy loam about 6 inches thick. The substratum to a depth of about 60 inches is light brownish gray, mottled very cobbly fine sandy loam. In some places limestone bedrock is at a depth of about 40 to 60 inches. In other places the surface layer is the cobbly, gravelly, very cobbly, or very gravelly analogs of fine sandy loam or silt loam or cobbly, gravelly, or very gravelly loam.

Included with this soil in mapping are small areas of the excessively drained Alpena and well drained Posen soils in landscape positions similar to or slightly higher than those of the Shelter soil. Also included are small areas of very stony or bouldery Shelter soils. Included soils make up about 5 to 15 percent of the map unit.

Permeability is very slow in the Shelter soil. The available water capacity is low. Surface runoff is slow. A perched seasonal high water table is at a depth of 0.5 to 1.0 foot from fall to late spring.

This soil is used as woodland. The major management concerns are the equipment limitation, the windthrow hazard, and plant competition. Equipment should be used only during dry summer months or during winter months when the snow cover is adequate. During wet periods, the surface layer and subsoil become saturated and unsurfaced logging roads are slippery. Year-round logging roads require a gravel base. Culverts are needed to maintain the natural drainage system. Landings generally can be used only during the driest part of the year and can be established only in nearly level areas. Large stones on the surface can reduce equipment speed and can result in equipment damage. Because of the firm substratum and the wetness, trees on this soil are shallow rooted. Some may be blown down during periods of high winds. Swamp conifers and aspen are the dominant cover types. Trees generally are not planted on this soil because of the large number of stones on the surface and the wetness.

This soil is generally unsuited to building site development because of the wetness, the stoniness, and the slope. It is generally unsuited to septic tank absorption fields because of the wetness, the stoniness, the slope, and the very slow permeability and to sewage lagoons because of the slope and the stoniness.

The woodland ordination symbol is 4X, the land capability classification is VIw, and the Michigan soil management group is Gbc. No habitat type is assigned.

148B—Longrie-Rock outcrop complex, 1 to 6 percent slopes. This map unit consists of a moderately deep, well drained, nearly level and undulating Longrie soil and exposed limestone bedrock on benches, ridgetops, and broad plains. The Rock outcrop occurs as flat areas or vertical drops of 5 to 15 feet. Individual areas of this unit are irregular in shape and range from 10 to 1,000 acres in size. They are 30 to 70 percent Longrie soil and 20 to 70 percent Rock outcrop. The Longrie soil and Rock outcrop occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Longrie soil has a surface layer of black sandy loam about 4 inches thick. The subsurface layer is reddish gray sandy loam about 5 inches thick. The subsoil is dark reddish brown and reddish brown, friable fine sandy loam about 18 inches thick. The substratum is light brown gravelly loam about 4 inches thick. Limestone bedrock is at a depth of about 31 inches. In some places the depth to bedrock is more than 40 inches or less than 20 inches. In other places the surface layer is fine sandy loam, loam, or silt loam.

Included with this unit in mapping are small areas of the moderately deep, somewhat excessively drained Duel soils and the deep, somewhat poorly drained Shelter soils. Duel soils are sandy and are underlain by limestone bedrock. They are in landscape positions similar to those of the Longrie soil. Shelter soils are loamy-skeletal. They are in landscape positions similar to those of the Longrie soil or are in slight depressions. Included soils make up about 5 to 10 percent of the map unit.

Permeability is moderate in the Longrie soil. The available water capacity is low. Surface runoff is slow.

This map unit is used as woodland. The major management concerns are the equipment limitation, the windthrow hazard, and plant competition. The use of equipment is limited by the exposed bedrock. The bedrock may interfere with road construction. Trafficability is briefly limited in spring and in other excessively wet periods. When the soil is wet, unsurfaced logging roads are slippery and ruts form easily. Because of the depth to bedrock, trees on the Longrie soil are shallow rooted. Some may be blown down during periods of high winds. Year-round logging roads should be graveled. The northern hardwoods cover type is dominant on the Longrie soil. Species preference can be managed by selective cutting. If seedlings are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

Because of the depth to bedrock, the Longrie soil is only fairly well suited to buildings without basements. It can be used as a site for buildings with basements if fill material is used to raise the site above the bedrock. The soil is generally unsuited to septic tank absorption fields and sewage lagoons because of the shallowness to bedrock and seepage.

The woodland ordination symbol assigned to the Longrie soil is 3D, the land capability classification is IIe, and the Michigan soil management group is 3/Ra. The primary habitat type is AVO.

149B—Kalkaska sand, 0 to 6 percent slopes, stony. This very deep, somewhat excessively drained, nearly level and undulating soil is on broad plains and upland flats. Stones and small boulders are on the surface. They range from 10 to more than 50 inches in diameter and are 350 to less than 25 feet apart. Individual areas of this soil are irregularly shaped or elongated and range from 10 to 200 acres in size.

Typically, the surface is covered by about 1 inch of partially decomposed leaf litter. The surface layer is dark reddish brown sand about 2 inches thick. The subsurface layer is reddish brown sand about 5 inches thick. The subsoil is about 24 inches thick. The upper part is dark reddish brown, friable loamy sand, and the lower part is dark brown and strong brown, very friable and loose sand. The substratum to a depth of about 60 inches is light yellowish brown sand. In places the surface layer is loamy sand.

Included with this soil in mapping are small areas of the moderately well drained Alcona and somewhat poorly drained Au Gres soils. Alcona soils formed in stratified, sandy and loamy deposits. They are in landscape positions similar to those of the Kalkaska soil. Au Gres soils are somewhat poorly drained and are in depressions. Included soils make up about 5 to 15 percent of the map unit.

Permeability is rapid in the Kalkaska soil. The available water capacity is low. Surface runoff is slow.

This soil is used as woodland. The major management concerns are the equipment limitation, seedling mortality, and plant competition. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. Large stones on the surface can hinder harvesting and can result in equipment damage. The mortality of planted or naturally established seedlings can be a problem during dry periods because of the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. The northern hardwoods cover type is dominant on this soil. Species preference can be managed by selective cutting. Some areas are clearcut. If trees are planted, site preparation by mechanical or chemical means is needed to control competing vegetation.

This soil is poorly suited to cropland, but such crops as oats, barley, wheat, and a mixture of grasses and legumes can be grown. The major management needs are measures that conserve moisture, maintain the organic matter content, and help to control soil blowing. Examples are buffer strips, vegetative barriers, field windbreaks, small grain crops, additions of organic material, and a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface. The stones on the surface make seedbed preparation difficult.

This soil is fairly well suited to pasture. Proper stocking rates, rotation grazing, strip grazing, and restricted use during dry periods help to keep the pasture in good condition. The stones on the surface can hinder the use of equipment for pasture improvement or seedbed preparation.

This soil is well suited to building site development. It is poorly suited to septic tank absorption fields because of a poor filtering capacity. It readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. The soil is generally unsuited to sewage lagoons because of seepage.

The woodland ordination symbol is 3S, the land capability classification is VIs, and the Michigan soil management group is 5a. The primary habitat type is ATD, and the secondary habitat type is TM.

150—Fibre muck. This very deep, poorly drained, nearly level soil is on low plains in depressions and drainageways. It is frequently ponded. Individual areas are irregular in shape and range from 5 to 500 acres in size.

Typically, the surface layer is black muck about 5 inches thick. The subsurface layer is brown sand about 8 inches thick. The subsoil is about 14 inches thick. It is mottled. The upper part is dark brown and reddish brown, very friable loamy sand and sandy loam. The lower part is reddish brown, firm clay. The substratum to a depth of about 60 inches is reddish brown, mottled clay that has thin bands of pinkish gray silt.

Included with this soil in mapping are small areas of the somewhat poorly drained Allendale and poorly drained Soo and Pickford soils. Allendale soils are on low knolls and ridges. Soo and Pickford soils have a subsoil that is finer textured than that of the Fibre soil. They are in landscape positions similar to those of the Fibre soil. Included soils make up about 5 to 15 percent of the map unit.

Permeability is moderately rapid and rapid in the upper part of the Fibre soil and very slow in the clayey lower part. The available water capacity is moderate. Surface runoff is very slow or ponded. A perched seasonal high water table is 1 foot above to 1 foot below the surface from fall to early summer.

Most areas are used as woodland. Some areas of abandoned farmland are reverting to speckled alder and willow.

The major concerns in managing woodland are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Equipment should be used only during dry summer months or during winter months when the snow cover is adequate. Year-round logging roads require fill and a gravel base. Culverts are needed to maintain the natural drainage system. The number of suitable landing sites is severely limited because of the wetness. Because of the high water table, trees on this soil are shallow rooted. Many may be blown down during periods of high winds. The swamp conifer cover type is dominant on this soil. After the trees are cut, plant competition can be expected to delay or prevent natural regeneration unless precautionary measures are taken. Trees generally are not planted on this soil because of the wetness, severe seedling mortality, plant competition, and low productivity.

This soil is generally unsuited to building site development because of the ponding. It is generally unsuited to septic tank absorption fields because of the ponding, seepage, and the restricted permeability and to sewage lagoons because of seepage, the ponding, and excess humus.

The woodland ordination symbol is 3W, the land capability classification is Vw, and the Michigan soil management group is 4/1c. The primary habitat type is TMC-D.

151—Beavertail muck. This very deep, poorly drained, nearly level soil is in depressions and on low plains. It is frequently ponded. Individual areas are oval or irregular in shape and range from 5 to 80 acres in size.

Typically, the surface layer is black muck about 8 inches thick. The subsoil is light yellowish brown, mottled, friable very gravelly fine sandy loam about 8 inches thick. The substratum to a depth of about 60 inches is light brownish gray and pale brown, mottled very gravelly fine sandy loam.

Included with this soil in mapping are small areas of the shallow, somewhat poorly drained Potagannissing soils and the deep, somewhat poorly drained Shelter soils. Shelter soils are on knolls and ridges. Also included are small areas of the very poorly drained Markey soils in landscape positions similar to those of the Beavertail soil. Markey soils formed in organic material 16 to 50 inches deep over sand. Included soils make up about 5 to 10 percent of the map unit.

Permeability is slow in the Beavertail soil. The available water capacity is moderate. Surface runoff is very slow or ponded. The seasonal high water table is 1 foot above to 1 foot below the surface from fall to early summer.

This soil is used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the wetness, the use of equipment is restricted to dry summer months or to winter months when the snow cover is adequate. Year-round logging roads require fill and a gravel base. Culverts are needed to maintain the natural drainage system. The number of suitable landing sites is severely limited because of the wetness. Because of the high water table, trees on this soil are shallow rooted. Many may be blown down during periods of high winds. The swamp conifer cover type is dominant on this soil. Clearcutting or stripcutting is common. After the trees are cut, competition from wetland brush can delay or prevent natural regeneration. Trees generally are not planted on this soil because of the wetness, severe seedling mortality, and plant competition.

This soil is generally unsuited to building site development because of the ponding. It is generally unsuited to septic tank absorption fields because of the ponding and the restricted permeability and to sewage lagoons because of the ponding and excess humus.

The woodland ordination symbol is 3W, the land capability classification is Vw, and the Michigan soil management group is Gbc. No habitat type is assigned.

152—Grousehaven muck. This very deep, very poorly drained, nearly level soil is in depressions and drainageways. It is frequently ponded. Individual areas are irregular in shape and range from 5 to 100 acres in size.

Typically, the surface layer is black muck about 15 inches thick. The substratum to a depth of about 60 inches is grayish brown, light brownish gray, and gray marl. In some places limestone bedrock is at a depth of about 60 inches. In other places the surface layer is mucky peat.

Included with this soil in mapping are small areas of the very poorly drained Chippeny soils. These soils are in landscape positions similar to those of the Grousehaven soil. They are mucky in the upper 20 to 40 inches and are underlain by limestone bedrock. They make up about 5 to 10 percent of the map unit.

Permeability is moderately slow to moderately rapid in the organic layer of the Grousehaven soil and slow or very slow in the marl. The available water capacity is high. Surface runoff is very slow or ponded. The seasonal high water table is 1 foot above to 1 foot below the surface throughout the year.

Most areas support shrubs and grasses and a few trees. The opportunities for logging are extremely limited because of the small number of trees, the instability of the muck, and wetness.

This soil is generally unsuited to building site development because of the ponding and low strength. It is generally unsuited to septic tank absorption fields and sewage lagoons because of the ponding, excess humus, and the restricted permeability.

No woodland ordination symbol is assigned to this soil. The land capability classification is VIIw, and the Michigan soil management group is M/Mc. No habitat type is assigned.

153—Dumps, limestone. This map unit consists of limestone slabs that are the result of dredging in the west Neebish channel. Areas of this unit support no vegetation. They range from 5 to 100 acres in size.

No interpretive groups are assigned.

154F—Dawson-Deer Park-Wainola complex, 0 to 50 percent slopes. This map unit consists of a very deep, very poorly drained, nearly level Dawson soil; a very deep, excessively drained, very steep Deer Park soil; and a very deep, somewhat poorly drained, nearly level Wainola soil. The Dawson soil is in low swales and depressions and is frequently ponded. The Deer Park soil is on ridges. The Wainola soil is on low ridges and small flats. Individual areas of this unit are irregular in shape and range from 10 to 1,000 acres in size. They are 30 to 50 percent Dawson soil, 20 to 40 percent Deer Park soil, and 15 to 30 percent Wainola soil. The three soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Dawson soil has a surface layer of yellowish brown sphagnum moss about 6 inches thick. Below this is dark reddish brown muck about 12 inches thick. The upper part of the substratum is dark brown and pinkish gray fine sand about 1 inch thick. The lower part to a depth of about 60 inches is dark reddish brown and dark brown fine sand. In places the organic layers are more than 51 inches thick.

Typically, the Deer Park soil has a surface layer of very dark gray fine sand about 1 inch thick. The subsurface layer is light brownish gray fine sand about 7 inches thick. The subsoil is yellowish brown and reddish yellow fine sand about 43 inches thick. The substratum to a depth of about 60 inches is light brown sand. In places it is mottled.

Typically, the Wainola soil is covered by about 3 inches of black, partially decomposed leaf litter. The surface layer is grayish brown fine sand about 5 inches thick. The subsoil is dark reddish brown, strong brown, and yellowish brown, mottled, friable fine sand about 19 inches thick. The substratum to a depth of about 60 inches is brown fine sand.

Included with these soils in mapping are small areas of the poorly drained Kinross and very poorly drained Markey soils. Markey soils formed in organic material 16 to 50 inches deep over sand and are less acid than the Dawson soil. Both of the included soils are in landscape positions similar to those of the Dawson soil. They make up about 5 to 10 percent of the map unit.

Permeability is moderately slow to moderately rapid in the organic layers of the Dawson soil and rapid in the sandy lower part. It is rapid in the Deer Park and Wainola soils. The available water capacity is low in the Deer Park and Wainola soils and high in the Dawson soil. Surface runoff is medium on the Deer Park soil, slow on the Wainola soil, and very slow or ponded on the Dawson soil. The Wainola soil has a seasonal high water table at a depth of 0.5 foot to 1.5 feet from late fall to late spring, and the Dawson soil has one that is 1 foot above to 1 foot below the surface from early fall to early summer and that seldom drops below a depth of 1 foot.

These soils are used as woodland. The major management concerns are the erosion hazard, the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Where possible, logging roads, skid trails, and landings should be located on the higher, drier sites. Year-round logging roads require fill and a gravel base. Culverts are needed to maintain the natural drainage system. Loose sand in heavily traveled areas can interfere with the traction of wheeled equipment, especially during dry periods. Erosion on the Deer Park soil can result from the concentration of runoff on roads, in the tracks of wheeled equipment, and on landings. Removing water with water bars, out-sloping road surfaces, culverts, and drop structures minimizes erosion. On the steepest slopes, equipment cannot be operated safely and special logging methods, such as yarding with a cable, may be needed. Logging roads and skid trails should be constructed in the less sloping areas or on ridgetops. In the lowest areas, access is limited to winter months when the logging roads and skid trails are frozen. Jack pine and red pine are the dominant cover types on the higher ridges. Aspen and swamp conifers are the dominant cover types on the lower ridges, and native bog vegetation is dominant in the swales. Seedling mortality is a problem in areas of the Deer Park and Wainola soils because of the low available water capacity. Planting containerized seedlings or special nursery stock can reduce the seedling mortality rate. Replanting may be necessary in some areas. Because of the high water table, trees in the lower areas are shallow rooted. Some may be blown down during periods of high winds. After the overstory is removed, plant competition is severe in the lower areas.

Because of the complex nature of this map unit, onsite investigation is needed to determine the suitability of the soils for building site development, septic tank absorption fields, and sewage lagoons.

The woodland ordination symbols are 2W, 4R, and 6W; the land capability classification is VIIw; and the Michigan soil management groups are Mc-a, 5.3a, and 5b. The primary habitat type is PCS, and the secondary habitat type is PVC.

155B—Allendale-Posen-Pickford complex, 0 to 6 percent slopes. This map unit consists of a very deep, somewhat poorly drained, nearly level Allendale soil; a very deep, well drained, nearly level and undulating Posen soil; and a very deep, poorly drained, nearly level Pickford soil. The Allendale and Posen soils are on low knolls and ridges, and the Pickford soil is in depressions and drainageways. On the knolls and ridges, stones and small boulders are on the surface. They range from 10 to more than 50 inches in diameter and are 350 to less than 25 feet apart. Individual areas of this unit are irregular in shape and range from 20 to 40 acres in size. They are 25 to 45 percent Allendale soil, 20 to 35 percent Posen soil, and 15 to 30 percent Pickford soil. The three soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Allendale soil has a surface layer of black loamy fine sand about 5 inches thick. The subsurface layer is pinkish gray fine sand about 3 inches thick. The subsoil is about 27 inches thick. The upper part is dark reddish brown, very friable loamy fine sand; the next part is strong brown and yellowish brown, mottled, very friable fine sand; and the lower part is reddish brown, mottled, firm silty clay. The substratum to a depth of about 60 inches is light reddish brown, mottled silty clay that has thin strata of yellowish brown silty clay loam and silt loam. In places the surface layer is fine sand or loamy sand.

Typically, the Posen soil is covered by about 1 inch of partially decomposed leaf litter. The surface layer is very dark gray stony fine sandy loam about 3 inches thick. The subsoil is about 13 inches of dark brown and brown, friable stony silt loam and very cobbly silt loam. The substratum to a depth of about 60 inches is brown very gravelly fine sandy loam. In places the surface layer is the gravelly or cobbly analogs of loam or silt loam or gravelly fine sandy loam.

Typically, the Pickford soil has a surface layer of very dark gray silty clay loam about 8 inches thick. The subsurface layer is dark gray, mottled silty clay loam about 2 inches thick. The subsoil is about 14 inches of weak red, mottled, firm and very firm silty clay and clay. The substratum to a depth of about 60 inches is reddish brown, mottled clay.

Included with these soils in mapping are small areas of the very poorly drained Dora, well drained Rockbottom, and somewhat poorly drained Rudyard soils. Dora soils have about 30 inches of muck in the upper part. They are in depressions. Rockbottom soils are extremely cobbly and are loamy. They are on the ridges and knolls. Rudyard soils are clayey throughout. They are in landscape positions similar to those of the Allendale soil. Included soils make up about 10 to 15 percent of the map unit.

Permeability is moderately rapid and rapid in the sandy upper part of the Allendale soil and very slow in the clayey lower part. It is moderate in the Posen soil and very slow in the Pickford soil. The available water capacity is moderate in all three soils. Surface runoff is slow on the Allendale and Posen soils and very slow or ponded on the Pickford soil. The Allendale soil has a perched seasonal high water table at a depth of 1 to 2 feet from late fall to spring, and the Pickford soil has one 1 foot above to 1 foot below the surface from fall to early summer.

These soils are used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the high water table, the use of equipment is restricted to dry summer months or to winter months when the snow cover is adequate. The stoniness of the ridges and knolls can hinder harvesting and planting and can result in equipment damage. Year-round logging roads should be graveled. Culverts are needed in depressions and drainageways to maintain the natural drainage system. Landing sites and roads should be located on the ridges and knolls. Selection of special planting stock, such as containerized seedlings, and special site preparation that protects the surface with thin layers of loose slash can reduce the seedling mortality rate. Because of the high water table, trees on these soils are shallow rooted. Some may be blown down during periods of high winds. The aspen cover type is dominant on these soils, but some small areas support sugar maple. After the trees are cut, plant competition in the wetter areas can delay natural regeneration. The opportunities for planting are limited because of the wetness and the stoniness.

These soils are poorly suited or unsuited to building site development and onsite waste disposal systems because of the wetness, the stoniness, the ponding, and the restricted permeability.

The woodland ordination symbols are 4W, 2X, and 6W; the land capability classification is IIIw; and the Michigan soil management groups are 4/1b, 3a, and 1c. The primary habitat type is TMC-D, and the secondary habitat type is AVO.

156A—Rockcut-Pinconning complex, 0 to 3 percent slopes. These soils are very deep and nearly level. The somewhat poorly drained Rockcut soil is on low knolls and ridges, and the poorly drained Pinconning soil is in depressions and drainageways. Stones and boulders are on the surface. They range from 10 to more than 50 inches in diameter and are 120 to less than 3 feet apart. They are on the knolls and ridges. Individual areas of this unit are irregular in shape and are about 600 acres in size. They are 45 to 65 percent Rockcut soil and 30 to 45 percent Pinconning soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Rockcut soil is covered by 3 inches of very dark brown leaf litter. The surface layer is very dark grayish brown very stony loamy sand about 4 inches thick. The subsoil is about 13 inches thick. It is mottled. The upper part is brown, very friable extremely cobbly loamy sand, and the lower part is brown and grayish brown, friable, stratified loamy sand, silt loam, and silty clay loam. The substratum is mottled. The upper part is grayish brown and yellowish brown silt loam about 18 inches thick. The lower part to a depth of about 60 inches is light brownish gray, brown, and reddish brown, stratified silt, silt loam, and silty clay. In places the surface layer is very cobbly sandy loam, extremely cobbly sandy loam, or very cobbly loamy sand.

Typically, the Pinconning soil has a surface layer of black mucky loamy sand about 8 inches thick. The substratum is mottled. The upper part is yellowish brown and grayish brown sand about 13 inches thick, and the lower part to a depth of about 60 inches is reddish gray and reddish brown silty clay and clay.

Included with these soils in mapping are small areas of the somewhat poorly drained Allendale, poorly drained Pickford, and moderately well drained Velvet soils. Allendale soils do not contain coarse fragments. They are in landscape positions similar to those of the Rockcut soil. Pickford soils are clayey throughout. They are in landscape positions similar to those of the Pinconning soil. Velvet soils are on the slightly higher ridges and knolls. Included soils make up about 10 to 15 percent of the map unit.

Permeability is rapid in the upper part of the Rockcut soil and moderately slow in the substratum. It is rapid in the upper part of the Pinconning soil and slow or very slow in the lower part. The available water capacity is moderate in the Rockcut soil and low in the Pinconning soil. Surface runoff is slow on the Rockcut soil and very slow or ponded on the Pinconning soil. The Rockcut soil has a seasonal high water table at a depth of 0.5 foot to 1.5 feet from fall to late spring, and the Pinconning soil has one 1 foot above to 1 foot below the surface from fall to early spring.

These soils are used as woodland. The major management concerns are the equipment limitation, seedling mortality, the windthrow hazard, and plant competition. Because of the high water table, the use of equipment is restricted to dry summer months or to winter months when the snow cover is adequate. The stoniness of the ridges and knolls can hinder harvesting and can result in equipment damage. Year-round logging roads should be graveled. Culverts are needed in depressions and drainageways to maintain the natural drainage system. Landing sites and roads should be located on the ridges and knolls. Because of the high water table, trees on these soils are shallow rooted. Some may be blown down during periods of high winds. Aspen and swamp conifers are the dominant cover types. After the trees are cut, plant competition in the wetter areas can delay natural regeneration. Trees generally are not planted on these soils because of the wetness and the stoniness.

These soils are poorly suited or unsuited to building site development and onsite waste disposal systems because of the wetness, the stoniness, the ponding, and the restricted permeability.

The woodland ordination symbol is 3W, the land capability classification is VIs, and the Michigan soil management groups are Gbc and 4/1c. No habitat type is assigned.

159B—Amasa-Sugar very fine sandy loams, 0 to 6 percent slopes. This map unit consists of very deep, nearly level and undulating, well drained Amasa and moderately well drained Sugar soils on broad plains and ridgetops. Individual areas are irregularly shaped or elongated and range from 20 to 500 acres in size. They are 40 to 60 percent Amasa soil and 30 to 50 percent Sugar soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Amasa soil is covered by about 1 inch of partially decomposed leaf litter. The surface layer is black very fine sandy loam about 1 inch thick. The subsurface layer is dark reddish gray very fine sandy loam about 4 inches thick. The subsoil is dark reddish brown and dark brown, friable very fine sandy loam about 13 inches thick. The next layer is strong brown fine sandy loam about 4 inches thick. The substratum to a depth of about 60 inches is strong brown sand. In places the surface layer is fine sandy loam or silt loam.

Typically, the Sugar soil has a surface layer of black very fine sandy loam about 3 inches thick. The subsurface layer is pinkish gray loamy very fine sand about 7 inches thick. The subsoil is about 35 inches thick. The upper part is dark brown and strong brown, very firm very fine sandy loam. The next part is yellowish brown and light brown, mottled, firm loamy very fine sand. The lower part is reddish brown and white, mottled, firm, stratified silt loam, loamy very fine sand, and silty clay loam. The substratum to a depth of about 60 inches is reddish brown and light reddish brown, stratified silt loam and clay. In some places the clay is below a depth of 40 inches. In other places layers of sand are above the clay.

Included with these soils in mapping are small areas of the somewhat excessively drained Kalkaska and moderately well drained Ontonagon soils. These included soils are in landscape positions similar to those of the Amasa and Sugar soils. Kalkaska soils are sandy throughout. Ontonagon soils are clayey throughout. Included soils make up about 5 to 15 percent of the map unit.

Permeability is moderate in the loamy upper part of the Amasa soil and very rapid in the sandy substratum. It is moderately rapid in the loamy upper part of the Sugar soil and very slow in the clayey lower part. The available water capacity is low in the Amasa soil and moderate in the Sugar soil. Surface runoff is slow on both soils. The Sugar soil has a perched seasonal high water table at a depth of 1.5 to 4.0 feet from late fall to late spring.

These soils are used as woodland. The major management concerns are the equipment limitation, the windthrow hazard, and plant competition. Trafficability is briefly limited in spring and in other excessively wet periods. When these soils are wet, haul roads and skid trails are slippery and ruts form easily. Deep ruts tend to restrict lateral drainage, expose tree roots, and alter soil structure. Year-round logging roads should be graveled. Because of the seasonal high water table, trees on the Sugar soil are shallow rooted. Some may be blown down during periods of high winds. The northern hardwoods cover type is dominant on these soils. Species preference can be managed by selective cutting. If seedlings are planted, site preparation by mechanical or chemical means generally is needed to control competing vegetation.

These soils are well suited to such crops as oats, barley, wheat, and a mixture of grasses and legumes. The major management needs are measures that control water erosion and soil blowing. Examples are small grain crops, grassed waterways, and a system of conservation tillage that does not invert the soil and that leaves all or part of the crop residue on the surface.

These soils are well suited to pasture. Overgrazing or grazing when the soils are wet causes surface compaction, destroys forage plants, and increases the susceptibility to erosion. Proper stocking rates, pasture rotation, and restricted use during wet periods help to keep the pasture in good condition.

The Sugar soil is poorly suited to building site development and septic tank absorption fields because of the wetness, the shrink-swell potential, and the very slow permeability in the clayey lower part of the profile. The Amasa soil is well suited to building site development. It is poorly suited to septic tank absorption fields because of a poor filtering capacity. It readily absorbs but does not adequately filter the effluent. The poor filtering capacity can result in the pollution of ground water. In areas of the Sugar soil, buildings should be constructed on well compacted fill material, which can raise the level of the site above the water table and reduce the shrink-swell potential. A drainage system can help to lower the water table. The Sugar soil is only fairly well suited to sewage lagoons because of the slope and seepage. The lagoons should be sealed and banked, installed on fill material, and artificially drained.

The woodland ordination symbol is 3L, the land capability classification is IIe, and the Michigan soil management groups are 3/5a and 3/1a. The primary habitat type is ATD.

159F—Amasa-Sugar very fine sandy loams, 25 to 50 percent slopes. These very deep, steep and very steep, well drained soils are on ridges, on side slopes, and in ravines. Individual areas are elongated and range from 5 to 60 acres in size. They are 35 to 55 percent Amasa soil and 30 to 50 percent Sugar soil. The two soils occur as areas so intricately mixed or so small that mapping them separately is not practical.

Typically, the Amasa soil is covered by about 1 inch of partially decomposed leaf litter. The surface layer is black very fine sandy loam about 1 inch thick. The subsurface layer is dark reddish gray very fine sandy loam about 4 inches thick. The subsoil is dark reddish brown and dark brown, friable very fine sandy loam about 13 inches thick. The next layer is strong brown fine sandy loam about 4 inches thick. The substratum to a depth of about 60 inches is strong brown sand. In places the surface layer is fine sandy loam or silt loam.

Typically, the Sugar soil has a surface layer of black very fine sandy loam about 3 inches thick. The subsurface layer is pinkish gray loamy very fine sand about 7 inches thick. The subsoil is about 35 inches thick. The upper part is dark brown and strong brown, very firm very fine sandy loam. The lower part is yellowish brown and light brown, firm loamy very fine sand and silty clay loam. The substratum to a depth of about 60 inches is reddish brown and light reddish brown, stratified silt loam and clay. In some areas the clay is below a depth of 40 inches. In places the subsoil is sand.

Included with these soils in mapping are small areas of the somewhat excessively drained Kalkaska and well drained Ontonagon soils. These included soils are in landscape positions similar to those of the Amasa and Sugar soils. Kalkaska soils are sandy throughout. Ontonagon soils are clayey throughout. Included soils make up about 10 to 20 percent of the map unit.

Permeability is moderate in the loamy upper part of the Amasa soil and very rapid in the sandy substratum. It is moderately rapid in the loamy upper part of the Sugar soil and very slow in the clayey lower part. The available water capacity is low in the Amasa soil and moderate in the Sugar soil. Surface runoff is rapid on both soils.

These soils are used as woodland. The major management concerns are the equipment limitation, the erosion hazard, and plant competition. Access is limited by the slope. Special care is needed in laying out logging roads and in operating equipment. The roads can be designed so that they conform to the natural slope of the land. Special logging methods, such as yarding with a cable, may be needed to minimize surface disturbance. Erosion can result from the concentration of runoff on roads, in the tracks of wheeled equipment, and on landings. Removing water with water bars, out-sloping road surfaces, culverts, and drop structures minimizes erosion. Landings should be located in the less sloping nearby areas. The northern hardwoods cover type is dominant on these soils. Species preference can be managed by selective cutting. After the overstory is removed, plant competition is moderate.

These soils are generally unsuited to building site development and sanitary facilities because of the slope.

The woodland ordination symbol is 3R, the land capability classification is VIIe, and the Michigan soil management groups are 3/5a and 3/1a. The primary habitat type is ATD.

Prime Farmland

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation's short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation's prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is the land that is best suited to food, feed, forage, fiber, and oilseed crops. It may be cultivated land, pasture, woodland, or other land, but it is not urban or built-up land or water areas. It either is used for food or fiber crops or is available for those crops. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce a sustained high yield of crops in an economic manner. Prime farmland produces the highest yields with minimal expenditure of energy and economic resources, and farming it results in the least damage to the environment.

Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The level of acidity or alkalinity is acceptable. Prime farmland has few or no rocks and is permeable to water and air. It is not excessively erodible or saturated with water for long periods and is not frequently flooded during the growing season. The slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Soil Conservation Service.

About 90,500 acres in the survey area, or about 9 percent of the total acreage, meets the soil requirements for prime farmland. Scattered areas of this land are throughout the county, but most are in associations 8, 9, and 12, which are described under the heading "General Soil Map Units."

A recent trend in land use in some parts of the county has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

The map units in Chippewa County that are considered prime farmland are listed in table 5. This list does not constitute a recommendation for a particular land use. The extent of each listed map unit is shown in table 4. The location is shown on the detailed soil maps at the back of this publication. The soil qualities that affect use and management are described under the heading "Detailed Soil Map Units."

Some soils that have a seasonal high water table and all soils that are frequently flooded during the growing season qualify for prime farmland only in areas where these limitations have been overcome by drainage measures or flood control. The need for these measures is indicated after the map unit name in table 5. Onsite evaluation is needed to determine whether or not these limitations have been overcome by corrective measures.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

The soils in the survey area are assigned to various interpretive groups at the end of each map unit description and in some of the tables. The groups for each map unit also are shown in the section "Interpretive Groups," which follows the tables at the back of this survey.

Crops and Pasture

Seldon Collins, district conservationist, Soil Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained *(12)*; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

In 1982, about 70,000 acres in Chippewa County, or about 6 percent of the total acreage, was farmland *(5)*. Most of the farmland is in long-term rotations of trefoil-grass hay and pasture. Small grain crops are also grown.

The potential of many of the soils in the county for hayland and pasture is excellent (fig. 9). Many farm fields that were once productive, however, are now overgrown brush because of low farm incomes and out-migration.

In the areas used for crops and pasture, management needs include measures that reduce wetness and compaction, control water erosion and soil blowing, conserve soil moisture, and improve fertility.

Soil wetness is the major management concern on most of the cropland in the county. Improving soil drainage can increase crop production. Surface and subsurface drainage is needed on most farm fields. Subsurface tiling is rare in areas of hayland because of the cost and the expected returns. Fieldwork is restricted when the soils are wet. Improving surface drainage and lowering the seasonal high water table allow for earlier spring planting and extend the harvest

Figure 9.—First cutting of trefoil-grass hay in an area of Pickford silt loam.

period. Also, these measures encourage deeper rooting of plants and allow for earlier germination. Examples of the soils in Chippewa County on which improved drainage is needed are Rudyard, Pickford, Soo, and Bowers soils.

The design of surface and subsurface drainage systems varies with the natural drainage, permeability, and texture of the soil. A combination of surface and subsurface drains may be needed to adequately drain most somewhat poorly drained, poorly drained, and very poorly drained soils. Locating adequate outlets for surface and subsurface drainage systems may be difficult in some areas. Where the drains empty into a ditch or ravine, rock chutes or drop structures may be needed to prevent gully erosion.

Soil compaction is a major management concern on clayey and loamy soils, such as Biscuit, Ontonagon, Pickford, and Rudyard soils. Excessive cultivation or working the soil when it is wet can result in compaction. In areas of loamy or clayey soils, allowing livestock to graze during wet periods also results in soil compaction and can retard the growth of pasture plants. Poor seedling emergence, lower water infiltration rates, restricted rooting depth, and reduced crop yields may result. Compacted clayey soils are hard or cloddy when dry, and preparing a seedbed may be difficult. Surface and subsurface drainage, rotation grazing, conservation tillage, and additions of manure help to prevent compaction and improve tilth.

Water erosion is a management concern on the undulating to rolling cropland in the county. It is a hazard on soils that have a slope of more than 2 percent and that have a loamy surface layer. Erosion of the surface layer reduces productivity through the loss of topsoil and fertilizer. Also, topsoil that washes downslope may pollute lakes and streams. Preparing a good seedbed on clayey soils is more difficult if the friable surface layer is lost. Livestock may cause erosion along the banks of ditches or streams as a result of overgrazing or grazing during wet periods. The soils in Chippewa County that have a potential erosion problem are Emmet, Ontonagon, Superior, and Sugar soils.

A cropping system that keeps plant cover on the surface for extended periods reduces the susceptibility to erosion and preserves the productive capacity of the soil. A system of conservation tillage that leaves protective amounts of crop residue on the surface can help to control surface runoff and erosion. Diversions, surface drains, grade stabilization structures, and grassed waterways help to prevent gully erosion caused by concentrated runoff.

Soil blowing is a hazard on sandy and silty soils, such as Alcona, Rousseau, and Sugar soils. A dry, bare surface is very susceptible to soil blowing. A permanent plant cover, windbreaks of trees or shrubs, surface mulch, spring plowing, a system of conservation tillage, or tillage methods that leave the surface rough help to control soil blowing.

Information concerning the design and application of erosion-control measures for different soils is available in local offices of the Soil Conservation Service.

Conserving soil moisture during dry periods is a management concern in areas of sandy soils, such as Croswell, Guardlake, Kalkaska, Manistee, and Rousseau soils. Moisture can be conserved by a system of conservation tillage that leaves all or most of the crop residue on the surface. Regular additions of manure and other organic materials increase the available water capacity.

Soil fertility is naturally high or medium in the finer textured soils and low in the sandy soils. Much of the farmland in the county has pH levels that are strongly acid to slightly acid. Applications of ground limestone are needed on these soils to raise the pH to the optimum level of 6.5. At this pH level most nutrients are readily available for plant growth. Additions of lime and fertilizer should be based on the results of soil tests, on the needs of the crop, and on expected yields. The Cooperative Extension Service can help in determining the kinds and amounts of fertilizer and lime needed *(7)*.

Pasture is an important land use in the county. Pastures should be topdressed every other year according to the results of soil tests. Clipping the pasture results in more uniform regrowth and controls weeds. A proper seeding mixture of pasture plants increases forage production. A mixture of birdsfoot trefoil, red clover, and timothy is commonly used. Alfalfa also is included in seeding mixtures in the better drained areas.

More specific information about seeding mixtures and seeding times is available at local offices of the Cooperative Extension Service and the Soil Conservation Service.

The productivity of a pasture and its ability to protect the surface of the soil are influenced by the number of livestock that the pasture supports, the length of time that they graze, and the distribution of rainfall. Good pasture management includes stocking rates that maintain the desired forage species, pasture rotation, deferred grazing, and restricted grazing during wet and extremely dry periods.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 6. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors. The land capability classification of each map unit also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 6 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for woodland and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c,* used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class I there are no subclasses because the soils of this class have few limitations. Class V contains only the subclasses indicated by *w, s,* or *c* because the soils in class V are subject to little or no erosion. They have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation.

The acreage of soils in each capability class and subclass is shown in table 7. The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in the yields table. Also given at the end of each map unit description is a Michigan soil management group *(8)*. The soils are assigned to a group according to the dominant profile texture, the natural drainage class, and the major management concerns. For soils making up a complex, the management groups are listed in the same order as the series named in the complex.

Woodland Management and Productivity

Woodland is the major land use in Chippewa County. About 805,000 acres, or about 79 percent of the total acreage, is woodland *(14)*. Governmental units manage 243,000 acres in the Hiawatha National Forest and 185,000 acres in the Lake Superior State Forest. The forest industry owns and manages 70,000 acres, and 267,000 acres is in non-industrial, private tracts. The remaining 40,000 acres of woodland is in state parks and other non-commercial areas.

The total standing commercial forest volume is about 55 percent hardwoods and 45 percent softwoods. Pine comprises 18 percent of forest types; spruce-fir-cedar, 27 percent; aspen-birch, 25 percent; and other northern hardwoods, 30 percent. The volume of growing stock on commercial forest land in Chippewa County was 741,628,000 cubic feet in 1980. Timber removals amounted to 4,983,000 cubic feet, and annual growth was 24,546,000 cubic feet.

Stands on upland soils are dominantly northern hardwoods consisting of sugar maple, red maple, beech, yellow birch, and aspen. Jack pine, red pine, and white pine are common on sandy soils. The wetter soils support stands of white spruce, balsam fir, red maple, balsam poplar, and aspen. Wooded swamps are generally white spruce, balsam fir, northern whitecedar, black spruce, and tamarack.

The wood products industry is an important employer in Chippewa County. Forest growth is greater than the actual harvest of wood products, however, because of the scarcity of markets within economical hauling distance. Productive soils, a good transportation system, an experienced work force, and an under-utilized woodland resource ensure future economic potential for the forest products industry in the county. As the forest resource is more fully utilized, better forest management, especially on small, privately owned tracts, will be needed to ensure a continuous supply of the desired species.

Pulpwood and lumber are the major wood products in the county. Other important products include firewood, poles and posts, Christmas trees, and maple syrup. A number of small wood-using manufacturers produce pallets, fencing, plywood, veneer, log homes, and building materials.

Table 8 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the ordination symbol for each soil. Soils assigned the same ordination symbol require the same general management and have about the same potential productivity.

The first part of the *ordination symbol*, a number, indicates the potential productivity of the soils for an indicator tree species. The number indicates the volume, in cubic meters per hectare per year, which the indicator species can produce. The number 1 indicates low potential productivity; 2 and 3, moderate; 4 and 5, moderately high; 6 to 8, high; 9 to 11, very high; and 12 to 39, extremely high. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *R* indicates steep slopes; *X*, stoniness or rockiness; *W*, excess water in or on the soil; *T*, toxic substances in the soil; *D*, restricted rooting depth; *C*, clay in the upper part of the soil; *S*, sandy texture; *F*, a high content of rock fragments in the soil; and *L*, low strength. The letter *A* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: R, X, W, T, D, C, S, F, and L.

In table 8, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Erosion hazard is the probability that damage will occur as a result of site preparation and cutting where the soil is exposed along roads, skid trails, fire lanes, and log-handling areas. Forests that have been burned or overgrazed are also subject to erosion. Ratings of the erosion hazard are based on the percent of the slope. A rating of *slight* indicates that no particular prevention measures are needed under ordinary conditions. A rating of *moderate* indicates that erosion-control measures are needed in certain silvicultural activities. A rating of *severe* indicates that special precautions are needed to control erosion in most silvicultural activities.

Equipment limitation reflects the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. The chief characteristics and conditions considered in the ratings are slope, stones on the surface, rock outcrops, soil wetness, and texture of the surface layer. A rating of *slight* indicates that under normal conditions the kind of equipment or season of use is not significantly restricted by soil factors. Soil wetness can restrict equipment use, but the wet period does not exceed 1 month. A rating of *moderate* indicates that equipment use is moderately restricted because of one or more soil factors. If the soil is wet, the wetness restricts equipment use for a period of 1 to 3 months. A rating of *severe* indicates that equipment use is severely restricted either as to the kind of equipment that can be used or the season of use. If the soil is wet, the wetness restricts equipment use for more than 3 months.

Seedling mortality refers to the death of naturally occurring or planted tree seedlings, as influenced by the kinds of soil, soil wetness, or topographic conditions. The factors used in rating the soils for seedling mortality are texture of the surface layer, depth to a seasonal high water table and the length of the period when the water table is high, rock fragments in the surface layer, effective rooting depth, and slope aspect. A rating of *slight* indicates that seedling mortality is not likely to be a problem under normal conditions. Expected mortality is less than 25 percent. A rating of *moderate* indicates that some problems from seedling mortality can be expected. Extra precautions are advisable. Expected mortality is 25 to 50 percent. A rating of *severe* indicates that seedling mortality is a serious problem. Extra precautions are important. Replanting may be necessary. Expected mortality is more than 50 percent.

Windthrow hazard is the likelihood that trees will be uprooted by the wind because the soil is not deep enough for adequate root anchorage. The main restrictions that affect rooting are a seasonal high water table and the depth to bedrock, a fragipan, or other limiting layers. A rating of *slight* indicates that under normal conditions no trees are blown down by the wind. Strong winds may damage trees, but they do not uproot them. A rating of *moderate* indicates that some trees can be blown down during periods when the soil is wet and winds are moderate or strong. A rating of *severe* indicates that many trees can be blown down during these periods.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index* and as a *volume* number. The site index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

The *volume*, a number, is the yield likely to be produced by the most important trees. This number, expressed as cubic feet per acre per year, indicates the amount of fiber produced in a fully stocked, even-aged, unmanaged stand. The volume was determined through the use of standard yield tables *(9)*.

The first species listed under *common trees* for a soil is the indicator species for that soil. It is the dominant species on the soil and the one that determines the ordination class.

Trees to plant are those that are suitable for commercial wood production.

Table 9 gives information about operating harvesting or thinning equipment in logging areas and on skid roads, landings, and logging roads. Limitations are given for the most limiting season and for the preferred season. The *most limiting season* in Chippewa County is spring or late fall. In some areas, however, it is during dry periods in summer, when loose sand can limit trafficability on deep, well drained, sandy soils.

The *preferred operating season* is the period when harvesting or thinning causes the least amount of soil damage. This period generally is when the soil is not too wet or when the ground is frozen or partly frozen or has an adequate snow cover.

In table 9 a rating of *slight* indicates that the use of conventional logging equipment is not restricted if normal logging methods are used. A rating of *moderate* indicates that the use of equipment is restricted because of one or more soil factors. If wetness is a limitation, high flotation equipment or special procedures may be needed to prevent the formation of ruts. A rating of *severe* indicates that the kind of equipment that can be used is seriously restricted.

Logging areas and skid roads include areas where some or all of the trees are being cut. Generally, equipment traffic is least intensive in the logging areas. Skid roads, which generally are within the logging area, are roads or trails over which logs are dragged or hauled from the stump to a log landing.

Log landings are areas where logs are assembled for transportation. Wheeled equipment may be used more frequently in these areas than in any other areas affected by logging.

Haul roads are access roads leading from primary or surfaced roads to the logging areas. The logging roads serve as transportation routes for wheeled logging equipment and logging trucks. Generally, they are unpaved roads. Some are graveled.

Forest Habitat Types

The information in this section is derived from a field guide developed for the Upper Peninsula of Michigan and for northeast Wisconsin *(3)*. The system of habitat classification used in the guide is based on the concept that plants occur in predictable patterns or communities and that these communities reflect differences in site characteristics.

Besides identifying the various habitat types by means of vegetative keys, the guide also provides information about the different possible successional stages for most of the habitat types. The successional stages depend largely on how the forest has been disturbed. They include the succession after logging in the original climax stands, the succession after logging in second-growth stands, and the succession in stands that have been both logged and burned.

The guide gives the suggested forest management for each of the successional stages. This management includes methods of thinning and harvest, site preparation, and measures that improve regeneration of the stands. The potential productivity, in terms of a site index and mean annual volume in cubic feet per acre per year, is given for most of the habitat types. The development of the descriptive or interpretive information for some of the habitat types, however, is based on limited data and thus should be used with caution.

Habitat types have been determined for most of the map units in Chippewa County. Where data on a map unit was inconclusive, no habitat type was assigned. Where habitat types were assigned, the primary habitat type is the one that is most common on the map unit. The secondary habitat type is less common. Habitat types are specified at the end of the descriptions in the section "Detailed Soil Map Units." They also are specified in the section "Interpretive Groups," which follows the tables at the back of this survey.

The following paragraphs describe the habitat types in the county. They provide information about the potential climax species, some of the common understory species, and, if known, the potential productivity of the habitat type.

ATD—Acer-Tsuga-Dryopteris habitat type. This habitat type has a potential climax overstory dominated by sugar maple. Other species include eastern hemlock, American beech, and American basswood. Yellow birch, red maple, and American elm are in some areas. The dominant ground flora includes spinulose woodfern, rosy twistedstalk, Solomons-seal, scarlet alder, and Canada mayflower. The potential productivity is moderately high for northern hardwoods and high for aspen. The potential productivity for red pine plantations is high if plant competition is controlled.

AVO—Acer-Viola-Osmorhiza habitat type. This habitat type has a potential climax overstory dominated by sugar maple. Other species include American basswood, white ash, yellow birch, eastern hophornbeam, eastern hemlock, and American elm. The dominant ground flora includes Canada white violet, sweet cicely, spinulose woodfern, ladyfern, Solomons-seal, and rosy twistedstalk. The potential productivity is high for northern hardwoods and aspen. It also is high for red pine plantations if plant competition is controlled.

AVO-A—Acer-Viola-Osmorhiza habitat type, Adiantum phase. This habitat type has a potential climax overstory dominated by sugar maple. Other species include American basswood, white ash, yellow birch, eastern hophornbeam, eastern hemlock, and American elm. The dominant ground flora includes Canada white violet, sweet cicely, spinulose woodfern, wild leek, maidenhair fern, ladyfern, Solomons-seal, and rosy twistedstalk. The potential productivity is high for northern hardwoods and aspen. It also is high for red pine plantations if plant competition is controlled.

FE—Fraxinum-Eupatorium habitat type. This habitat type has a potential climax overstory dominated by black ash and American elm. Other species include red maple, balsam fir, and white ash. The dominant ground flora includes sedge, speckled alder, northern dewberry, boneset, spotted joe-pye weed, and water hemlock.

PCS—Picea-Chamadaphne-Sphagnum habitat type. This habitat type has a potential climax overstory dominated by black spruce. Other species include tamarack and northern whitecedar. The dominant ground flora includes leatherleaf, bog rosemary, pale laurel, sphagnum, Labrador tea ledum, sedge, and Canada blueberry.

PVC—Pinus-Vaccinium-Carex habitat type. This habitat type has a potential climax overstory dominated by jack pine. Other species include red pine, black spruce, and white pine. The dominant ground flora includes sedge, low sweet blueberry, sweet fern, juneberry, Canada mayflower, and spinulose woodfern.

QAE—Quercus-Acer-Epigea habitat type. This habitat type has a potential climax overstory dominated by red oak and red maple. Other species are white spruce and eastern white pine. The dominant ground flora includes brackenfern, trailing arbutus, wintergreen, lowbush blueberry, mosses, and Canada blueberry. The potential productivity is moderately low for aspen and moderate for red pine and jack pine.

TAM—Tsuga-Acer-Mitchella habitat type. This habitat type has a potential climax overstory dominated by sugar maple and eastern hemlock. Other species include red maple, American basswood, white ash, and yellow birch. The dominant ground flora includes sedge, wild sarsaparilla, partridgeberry, horsetail, bigleaf aster, Canada mayflower, ladyfern, American fly honeysuckle, rosy twistedstalk, and northern dewberry. The potential productivity is moderately low for northern hardwoods and moderate for aspen.

TAM-Eq—Tsuga-Acer-Mitchella habitat type, Equisetum phase. This habitat type has a potential climax overstory dominated by sugar maple and eastern hemlock. Other species include black ash, American elm, red maple, American basswood, white ash, and yellow birch. The dominant ground flora includes sedge, wild sarsaparilla, partridgeberry, horsetail, bigleaf aster, Canada mayflower, ladyfern, American fly honeysuckle, rosy twistedstalk, and northern dewberry. The potential productivity is moderately low for northern hardwoods and moderate for aspen.

TM—Tsuga Maianthemum habitat type. This habitat type has a potential climax overstory dominated by eastern hemlock, sugar maple, and red maple. Other species include yellow birch, white spruce, balsam fir, eastern white pine, northern red oak, northern whitecedar, and American basswood. The dominant ground flora includes Canada mayflower, brackenfern, sedge, American starflower, and wild sarsaparilla. The potential productivity is moderate for northern hardwoods, moderately high for aspen, and high for red pine and jack pine.

TMC—Tsuga-Maianthemum-Coptis habitat type. This habitat type has a potential climax overstory dominated by eastern hemlock and red maple. Sugar maple and yellow birch are common. Other species include balsam fir, white spruce, and northern whitecedar. The dominant ground flora includes Canada mayflower, goldthread, yellow beadlily, bunchberry dogwood, American starflower, and spinulose woodfern. The potential productivity is moderate for northern hardwoods and aspen.

TMC-D—Tsuga-Maianthemum-Coptis habitat type, Dryopteris phase. This habitat type has a potential climax overstory dominated by eastern hemlock and red maple. Sugar maple and yellow birch are common. Other species include balsam fir, white spruce, and northern whitecedar. The dominant ground flora includes Canada mayflower, goldthread, yellow beadlily, bunchberry dogwood, American starflower, spinulose woodfern, long beech fern, oakfern, and Solomons-seal. The potential productivity is moderate for northern hardwoods and aspen.

TMC-V—Tsuga-Maianthemum-Coptis habitat type, Vaccinium phase. This habitat type has a potential climax overstory dominated by eastern hemlock and red maple. Sugar maple and yellow birch are common. Other species include balsam fir, white spruce, and northern whitecedar. The dominant ground flora includes Canada mayflower, goldthread, yellow beadlily, bunchberry dogwood, American starflower, Canada blueberry, lowbush blueberry, and spinulose woodfern. The potential productivity is moderate for northern hardwoods and aspen.

TMV—Tsuga-Maianthemum-Vaccinium habitat type. This habitat type has a potential climax overstory dominated by eastern hemlock and red maple. Other species include sugar maple, eastern white pine, balsam fir, white spruce, and northern red oak. The dominant ground flora includes Canada blueberry, wild sarsaparilla, brackenfern, Canada mayflower, lowbush blueberry, yellow beadlily, and wood betony. The potential productivity is moderate for northern hardwoods, moderately high for aspen, and high for red pine and jack pine.

TTP—Tsuga-Thuga-Thuja-Petasites habitat type. This habitat type has a potential climax overstory dominated by eastern hemlock and northern whitecedar. Other species include balsam fir, red maple, and sugar maple. The dominant ground flora includes palmate-leaved sweet coltsfoot, bigleaf aster, sedge, barren strawberry, northern dewberry, bunchberry dogwood, wild sarsaparilla, and black snakeroot. The potential productivity is moderately low for aspen.

TTS—Tsuga-Thuja-Sphagnum habitat type. This habitat type has a potential climax overstory dominated by eastern hemlock and northern whitecedar. Other species include balsam fir, black spruce, and red maple. The dominant ground flora includes sphagnum, goldthread, bunchberry dogwood, sedge, Canada mayflower, American starflower, and wood sorrel.

Windbreaks and Environmental Plantings

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens, and they furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow plantings made at right angles to the prevailing wind and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Table 10 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 10 are based on measurements and observation of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Soil Conservation Service or the Cooperative Extension Service or from a commercial nursery.

Recreation

A variety of year-round recreational opportunities is available in Chippewa County. Large areas of woodland and accessible waters with many public and privately operated facilities have made tourism an important element in the area's economy.

Over 400,000 acres in the Hiawatha National Forest and Lake Superior State Forest are available for camping, hunting, hiking, and bird watching. Detour, Brimley, and Tahquamenon Falls State Parks provide an additional 17,000 acres for outdoor recreation. Also, winter snow conditions have made the area popular for snowmobiling, cross-country skiing, and snowshoeing. Several golf courses are located in the county.

Chippewa County has about 421 miles of Great Lakes shoreline, including islands in the St. Mary's River system, and has 39,000 acres of inland water. It has many man-made and natural lakes and ponds and about 800 miles of rivers and streams. Beaches, public access sites, and private marinas provide numerous opportunities for boating, fishing, canoeing, and swimming. Winter ice conditions on the bays and lakes make large areas accessible for ice fishing.

The soils of the survey area are rated in table 11 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreation use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 11, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 11 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 14 and interpretations for dwellings without basements and for local roads and streets in table 13.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes or stones or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Wildlife Habitat

Chippewa County has large areas of woodland and wetlands suitable for wildlife, including warm- and cold-water fish species. Common game species in the county include whitetail deer, black bear, snowshoe hare, ruffed grouse, sharptail grouse, woodcock, Canadian geese, ducks, and other small game. Furbearers include beaver, otter, fox, coyote, and bobcat. A number of endangered and environmentally sensitive species live or nest in the county. Among these are bald eagles, American osprey, sandhill cranes, common loon, fishers, and pine martens. The Great Lakes and inland waters produce good populations of various types of trout and salmon, muskellunge, whitefish, walleye, northern pike, yellow perch, bass, and other species.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 12, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, rye, and barley (fig. 10).

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are birdsfoot trefoil, reed canarygrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are shield fern, goldenrod, wild lily of the valley, club mosses, and hairgrass.

Figure 10.—Sandhill cranes, on their migratory flight south, in an oat field in an area of Pickford silt loam.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, aspen, beech, sugar maple, dogwood, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian olive, autumn olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, and cedar.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are water horsetail, leatherleaf, wildrice, cattail, marsh marigold, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include sharptail grouse, red fox, woodchucks, marsh hawks, American kestrel, and shrews.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, porcupine, moose, raccoon, deer, bear, bobcat, and coyote.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, otter, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreation uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 13 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock or a very firm dense layer, stone content, soil texture, and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and depth to the water table.

Dwellings and *small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a dense layer, large stones, slope, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 or 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year.

They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or stabilized soil material; and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a dense layer, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a dense layer, and the available water capacity in the upper 40 inches affect plant growth. Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

Sanitary Facilities

Table 14 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 14 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a dense layer, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water (fig. 11).

Table 14 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a dense layer, flooding, large stones, and content of organic matter.

Excessive seepage resulting from rapid permeability in the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and dense layers can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

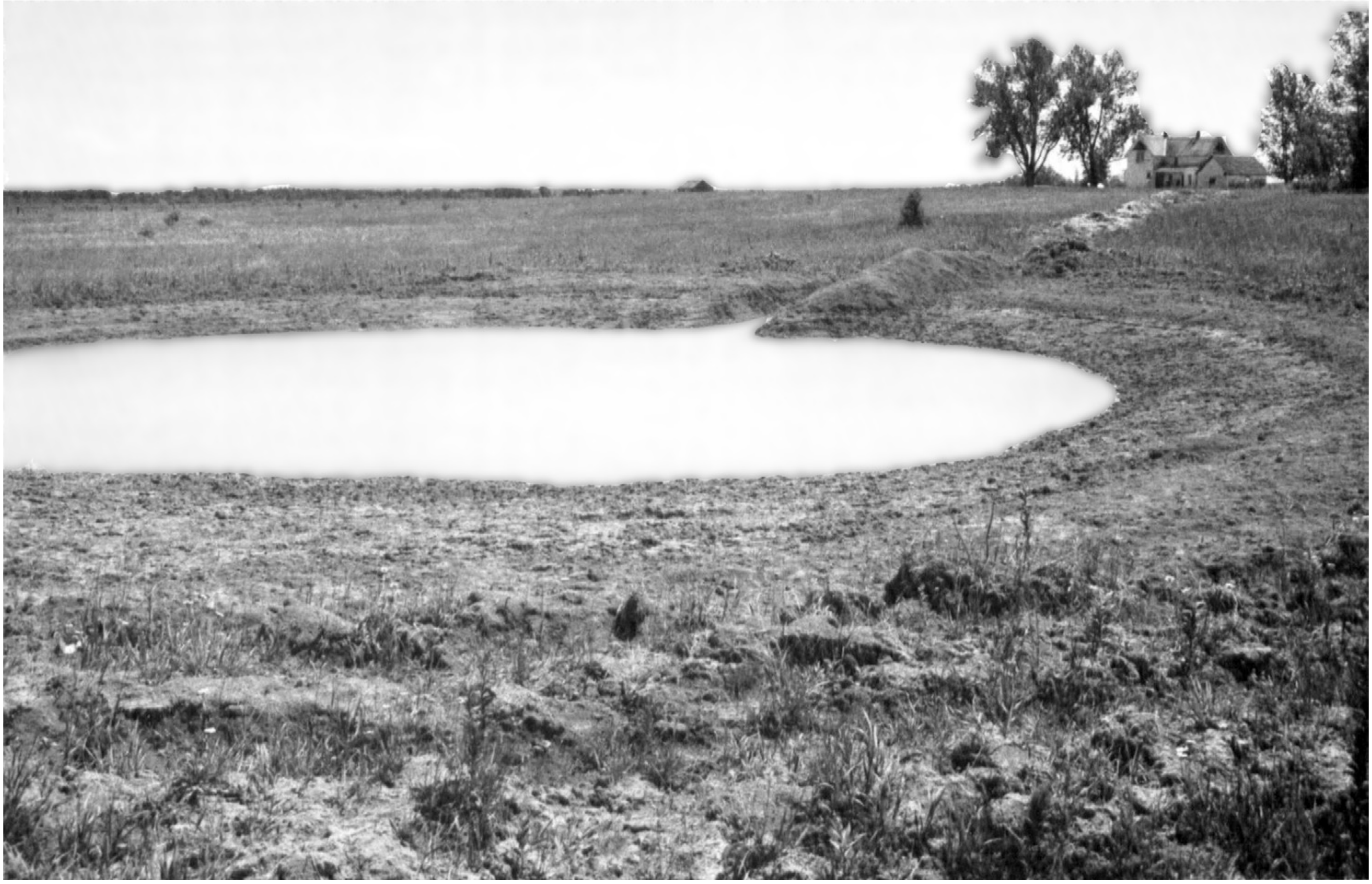


Figure 11.—A sewage lagoon in an area of Rudyard silty clay loam, 0 to 3 percent slopes.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of groundwater pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 14 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a dense layer, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, and soil reaction affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a dense layer, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 15 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a *probable* or *improbable* source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help to determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, a low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have a moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and depth to the water table is less than 1 foot. These soils may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 15, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, and bedrock.

Soils rated *good* have friable loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are naturally fertile or respond well to fertilizer and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel or stones, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel or stones, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 16 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives for each soil the restrictive features that affect drainage, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, or organic matter. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table and permeability of the aquifer. Depth to bedrock and the content of large stones affect the ease of excavation.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a dense layer, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or to a dense layer, large stones, slope, and the hazard of cutbanks caving. Availability of drainage outlets is not considered in the ratings.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of soil blowing or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a dense layer affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classification, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

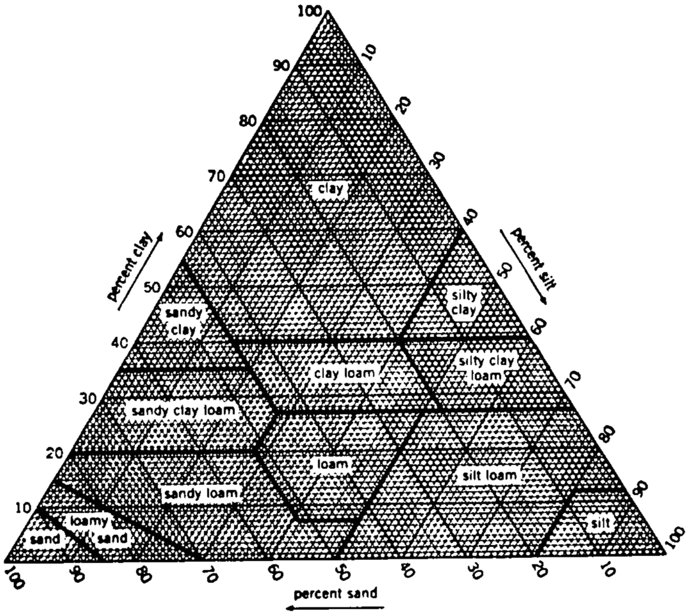


Figure 12.—Percentages of clay, silt, and sand in the basic USDA soil textural classes.

Engineering Index Properties

Table 17 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter (fig. 12). "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as about 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical and Chemical Properties

Table 18 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, and plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at ⅓ bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.05 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their resistance to soil blowing in cultivated areas. The groups indicate the susceptibility to soil blowing. Soils are grouped according to the following distinctions:

1. Coarse sands, sands, fine sands, and very fine sands. These soils are generally not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material. These soils are very highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control soil blowing are used.

4L. Calcareous loams, silt loams, clay loams, and silty clay loams. These soils are erodible. Crops can be grown if intensive measures to control soil blowing are used.

4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay. These soils are moderately erodible. Crops can be grown if measures to control soil blowing are used.

5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material. These soils are slightly erodible. Crops can be grown if measures to control soil blowing are used.

6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material. These soils are very slightly erodible. Crops can be grown if ordinary measures to control soil blowing are used.

8. Soils that are not subject to wind erosion because of coarse fragments on the surface or because of surface wetness.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 18, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 19 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Subsidence is the settlement of organic soils or of saturated mineral soils of very low density. Subsidence results from either desiccation and shrinkage or oxidation of organic material, or both, following drainage. Subsidence takes place gradually, usually over a period of several years. Table 19 shows the expected initial subsidence, which usually is a result of drainage, and total subsidence, which usually is a result of oxidation.

Not shown in the table is subsidence caused by an imposed surface load or by the withdrawal of ground water throughout an extensive area as a result of lowering the water table.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage mainly to pavements and other rigid structures.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severe corrosion environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Table 20 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils not protected by vegetation are assigned to one of four groups. They are grouped according to the infiltration of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups in table 20, the first letter is for drained areas and the second is for undrained areas.

Flooding, the temporary inundation of an area, is caused by overflowing streams or by runoff from adjacent slopes or lake levels. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 20 gives the frequency and duration of flooding and the time of year when flooding is most likely.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *occasional* that it occurs, on the average, once or less in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 20 are the depth to the seasonal high water table; the kind of water table—that is, perched or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 20.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Characterization Data for Selected Soils

Some of the soils in Chippewa County were sampled for physical and chemical analyses by the Soil Research Laboratory, Michigan Technological University, Houghton, Michigan, and the Soil Survey Investigations Staff, Soil Conservation Service, Lincoln, Nebraska. The laboratory data obtained from the soil samples include analyses of particle-size distribution, coarse fragments, bulk density, and moisture retention. Complete chemical analyses were also performed on each sample, and spodic horizon criteria were determined on the appropriate samples. Standard National Cooperative Soil Survey procedures were used for all analyses. Forest sites were also sampled for an estimate of the productivity of many of the sampled soils for wood products.

These data were used in classifying and correlating the soils and in evaluating their behavior, especially under forestry uses. Nine profiles were selected as representative of their respective series. These series and their laboratory identification numbers are as follows: Biscuit (S85MI-033-001), Deer Park (S84MI-033-004), Ermatinger (S84MI-033-003), Fibre (S85MI-033-003), Gogomain (S85MI-033-002), Kalkaska (S84MI-033-001), Shelter (S85MI-033-004), Soo (S84MI-033-005), and Wega (S84MI-033-002).

These data are available at the Soil Research Laboratory, Michigan Technological University, Houghton, Michigan; the Soil Survey Investigations Staff, Soil Conservation Service, Lincoln, Nebraska; the Soil and Water Conservation Division, Michigan Department of Agriculture, Lansing, Michigan; and the Soil Conservation Service, State Office, East Lansing, Michigan.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(12)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 21 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Eleven soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol.* An example is Spodosol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aquod (*Aqu,* meaning water, plus *od,* from Spodosol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplaquods (*Hapl,* meaning minimal horizonation, plus *aquod,* the suborder of the Spodosols that has an aquic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplaquods.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is sandy, mixed, frigid Typic Haplaquods.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual (11)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (13)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Alcona Series

The Alcona series consists of very deep, moderately well drained and well drained, moderately permeable soils on lake plains, outwash plains, and ground moraines. These soils formed in stratified, sandy and loamy deposits. Slopes range from 0 to 50 percent.

The Alcona soils in this county are taxadjuncts to the series because they do not have an argillic horizon. This difference, however, does not affect the use and management of the soils.

Alcona soils are commonly adjacent to Kalkaska, Markey, Rousseau, and Rudyard soils. Kalkaska and Rousseau soils are sandy. They are in landscape positions similar to those of the Alcona soils. Markey soils are very poorly drained and are in depressions and along drainageways. They formed in organic material 16 to 51 inches deep over sand. Rudyard soils are somewhat poorly drained and are in the lower landscape positions. They are clayey.

Typical pedon of Alcona loamy very fine sand, 0 to 6 percent slopes, 3,160 feet south and 990 feet east of the northwest corner of sec. 27, T. 43 N., R. 2 E.

Oi—1 inch to 0; undecomposed hardwood leaf litter.

E—0 to 3 inches; brown (7.5YR 5/2) loamy very fine sand; moderate fine subangular blocky structure; very friable; many fine and medium and common coarse roots; strongly acid; abrupt irregular boundary.

Bhs—3 to 4 inches; dark reddish brown (5YR 3/2) very fine sandy loam; moderate fine and medium angular blocky structure; very friable; many fine and medium and common coarse roots; strongly acid; abrupt irregular boundary.

Bs1—4 to 6 inches; dark reddish brown (5YR 3/4) very fine sandy loam; moderate fine and medium angular blocky structure; very friable; many fine and medium and common coarse roots; strongly acid; clear irregular boundary.

Bs2—6 to 10 inches; dark brown (7.5YR 4/4) very fine sandy loam; weak fine and medium angular blocky structure; very friable; few fine and medium roots; strongly acid; clear wavy boundary.

Bs3—10 to 17 inches; yellowish brown (10YR 5/6) very fine sandy loam; weak fine and medium angular blocky structure; very friable; few fine and medium roots; medium acid; clear wavy boundary.

Bw—17 to 23 inches; brownish yellow (10YR 6/6) loamy very fine sand; weak fine and medium angular blocky structure; very friable; few fine roots; few fine vesicular pores; medium acid; abrupt wavy boundary.

E/B—23 to 55 inches; about 65 percent light brownish gray (10YR 6/2) and light yellowish brown (10YR 6/4) loamy very fine sand (E); surrounding peds of brown (7.5YR 5/4) and strong brown (7.5YR 5/6) very fine sandy loam (Bt); common medium and coarse prominent yellowish red (5YR 5/8) mottles; strong very thick platy structure parting to moderate fine angular blocky; friable; few fine roots; few fine vesicular pores; few fine faint brown (7.5YR 5/4) clay films on faces of peds and in pores; medium acid; clear wavy boundary.

C—55 to 60 inches; yellowish brown (10YR 5/4) and strong brown (7.5YR 4/6), stratified silt, silt loam, fine sand, very fine sand, and loamy very fine sand and thin bands of silty clay loam; few fine faint strong brown (7.5YR 5/6) and few medium distinct strong brown (7.5YR 5/8) mottles; massive; friable; few fine roots; medium acid.

The solum is 22 to 60 inches thick. Some pedons have an A horizon. This horizon is 1 to 4 inches thick. It has hue of 5YR or 7.5YR, value of 2, and chroma of 1 or 2. It is loamy fine sand, loamy very fine sand, or very fine sandy loam. The E horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 to 6, and chroma of 2 or 3. It is loamy very fine sand, very fine sand, loamy fine sand, or very fine sandy loam.

The Bhs horizon has hue of 7.5YR or 10YR and value and chroma of 2 or 3. It is loamy fine sand, loamy very fine sand, very fine sandy loam, or very fine sand.

The E part of the E/B horizon has colors and textures similar to those of the E horizon. The Bt part has hue of 7.5YR or 10YR and value and chroma of 4 to 6. It is very fine sand, loamy very fine sand, or very fine sandy loam.

The C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 3 to 6.

Allendale Series

The Allendale series consists of very deep, somewhat poorly drained soils on lake plains, outwash plains, and ground moraines. These soils formed in sandy deposits over clayey material. Permeability is moderately rapid and rapid in the upper part of the profile and very slow in the lower part. Slopes range from 0 to 3 percent.

Allendale soils are commonly adjacent to Bowers and Soo soils. Bowers and Soo soils are finer textured in the subsoil than the Allendale soils. Bowers soils are in landscape positions similar to those of the Allendale soils. Soo soils are poorly drained and are in depressional areas.

Typical pedon of Allendale loamy fine sand, 0 to 3 percent slopes, 2,000 feet west and 800 feet south of the northeast corner of sec. 19, T. 44 N., R. 3 W.

Ap—0 to 5 inches; black (10YR 2/1) loamy fine sand, gray (10YR 5/1) dry; weak medium granular structure; very friable; many fine to coarse roots;

medium acid; clear smooth boundary.

E—5 to 8 inches; pinkish gray (7.5YR 6/2) fine sand; weak medium subangular blocky structure; very friable; many fine and medium roots; medium acid; clear irregular boundary.

Bhs—8 to 10 inches; dark reddish brown (5YR 3/3) loamy fine sand; weak medium subangular blocky structure; very friable; many fine and medium roots; about 10 percent weakly cemented ortstein; medium acid; clear irregular boundary.

Bs1—10 to 15 inches; strong brown (7.5YR 4/6) fine sand; common medium distinct yellowish red (5YR 4/6) mottles; moderate medium subangular blocky structure; very friable; common fine roots; slightly acid; clear wavy boundary.

Bs2—15 to 31 inches; yellowish brown (10YR 5/6) fine sand; many coarse prominent strong brown (7.5YR 5/8) and medium prominent yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure; very friable; common fine roots; neutral; abrupt smooth boundary.

2Bt—31 to 35 inches; reddish brown (5YR 5/4) silty clay; many medium distinct yellowish red (5YR 5/8), many fine prominent light greenish gray (5G 7/1) and grayish green (5GY 6/1), and common fine prominent light olive brown (2.5Y 5/6) mottles; weak coarse subangular blocky structure; firm; many faint reddish brown (5YR 4/4) clay films on faces of peds and in old root channels; slight effervescence; mildly alkaline; clear smooth boundary.

2C—35 to 60 inches; light reddish brown (5YR 6/3) silty clay that has thin strata of yellowish brown (10YR 5/4) silty clay loam and silt loam; many coarse distinct pinkish gray (7.5YR 6/2), common medium prominent strong brown (7.5YR 5/8), common fine prominent red (2.5YR 5/6), and few fine prominent light greenish gray (5G 7/1) mottles; massive; firm; strong effervescence; moderately alkaline.

The solum ranges from 30 to 40 inches in thickness. The upper sandy layers range from 20 to 35 inches in thickness.

The Ap horizon has hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 1 to 3. Some pedons have an A horizon. This horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 or 2.

The Bhs horizon has hue of 7.5YR or 5YR and chroma of 2 or 3. It is loamy fine sand, fine sand, or sand. The Bs horizon has value of 3 to 5 and chroma of 4 to 6. It is sand or fine sand. The 2Bt horizon has hue of 5YR or 7.5YR and value of 4 to 6. It is clay or silty clay. Some pedons have an E′ or E/B horizon.

The C horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 to 6, and chroma of 2 to 4. It is clay or silty clay or is stratified with thin bands of silt loam and silty clay loam.

Alpena Series

The Alpena series consists of very deep, excessively drained, very rapidly permeable soils on outwash plains, eskers, and beach ridges. These soils formed in loamy and sandy deposits. Slopes range from 0 to 15 percent.

The Alpena soils in this county have a Bw horizon, which is outside the range of the series. This difference, however, does not affect the use and management of the soils.

Alpena soils are commonly adjacent to Shelter and Posen soils. The adjacent soils are in landscape positions similar to those of the Alpena soils or are slightly lower on the landscape. They are finer textured than the Alpena soils. Shelter soils are somewhat poorly drained.

Typical pedon of Alpena very cobbly sandy loam, in an area of Shelter-Alpena complex, 0 to 15 percent slopes; 1,900 feet south and 1,200 feet west of the northeast corner of sec. 24, T. 41 N., R. 6 E.

Oe—3 inches to 0; decomposed and partially decomposed leaf litter.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) very cobbly sandy loam, dark grayish brown (10YR 4/2) dry; weak fine granular structure; friable; few fine and medium roots; about 15 percent gravel and 30 percent cobbles; mildly alkaline; clear smooth boundary.

Bw—4 to 16 inches; brown (10YR 5/3) very cobbly fine sandy loam; weak fine subangular blocky structure; very friable; few fine roots; about 30 percent gravel and 30 percent cobbles; slight effervescence; moderately alkaline; clear wavy boundary.

2C—16 to 60 inches; pale brown (10YR 6/3) extremely gravelly sand; single grain; loose; few fine roots; about 70 percent gravel and 15 percent cobbles; slight effervescence; moderately alkaline.

The thickness of the solum ranges from 9 to 18 inches. The content of gravel and cobbles ranges from 10 to 60 percent in the solum and from 35 to 85 percent in the 2C horizon.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The Bw horizon has value of 3 to 5 and chroma of 3 or 4. It is fine sandy loam, sandy loam, or the gravelly, very gravelly, cobbly, or very cobbly analogs of those textures. The 2C horizon has value of 5 to 7 and chroma of 3 or 4. It is very gravelly or extremely gravelly sand or stratified sand and gravel.

Amasa Series

The Amasa series consists of very deep, well drained soils on outwash plains and ground moraines. These soils formed in loamy deposits underlain by sand or gravelly sand. Permeability is moderate in the upper part of the profile and very rapid in the lower part. Slopes range from 0 to 50 percent.

The Amasa soils in this county have a thinner Bhs horizon than is defined as the range for the series. This difference, however, does not affect the use and management of the soils.

Amasa soils are commonly adjacent to Rousseau, Rudyard, and Sugar soils. Rousseau and Sugar soils are in landscape positions similar to those of the Amasa soils. Rousseau soils formed in deposits of fine sand. Sugar soils formed in silty deposits 20 to 40 inches deep over clay. Rudyard soils formed in clayey deposits. They are somewhat poorly drained and are lower on the landscape than the Amasa soils.

Typical pedon of Amasa very fine sandy loam, 0 to 6 percent slopes, 2,200 feet east and 1,600 feet north of the southwest corner of sec. 20, T. 48 N., R. 7 W.

Oe—1 inch to 0; partially decomposed leaf litter; abrupt smooth boundary.

A—0 to 1 inch; black (5YR 2/1) very fine sandy loam, dark gray (5YR 4/1) dry; moderate medium granular structure; friable; many very fine to medium roots; about 2 percent gravel; very strongly acid; abrupt wavy boundary.

E—1 to 5 inches; dark reddish gray (5YR 4/2) very fine sandy loam; moderate medium subangular blocky structure parting to moderate fine subangular blocky; friable; many very fine to coarse roots; about 2 percent gravel; very strongly acid; abrupt wavy boundary.

Bhs—5 to 6 inches; dark reddish brown (5YR 3/3) very fine sandy loam; moderate medium subangular blocky structure; friable; many very fine to coarse roots; about 2 percent gravel; strongly acid; abrupt wavy boundary.

Bs1—6 to 12 inches; dark brown (7.5YR 3/4) very fine sandy loam; moderate medium subangular blocky structure; friable; many very fine to coarse roots; about 2 percent gravel; strongly acid; gradual wavy boundary.

Bs2—12 to 18 inches; dark brown (7.5YR 4/4) very fine sandy loam; moderate medium subangular blocky structure; friable; common very fine to coarse roots; about 2 percent gravel; strongly acid; gradual wavy boundary.

BC—18 to 22 inches; strong brown (7.5YR 4/6) fine sandy loam; weak medium subangular blocky structure; friable; few very fine and fine roots; about 5 percent gravel and 5 percent cobbles; medium acid; abrupt wavy boundary.

2C—22 to 60 inches; strong brown (7.5YR 4/6) sand; single grain; loose; few very fine and fine roots; about 5 percent gravel and 5 percent cobbles; slightly acid.

The solum is 18 to 32 inches thick. The content of gravel and cobbles ranges from 0 to 5 percent in the solum. In the substratum, the content of gravel ranges from 0 to 10 percent and the content of cobbles ranges from 0 to 5 percent.

The A horizon has hue of 7.5YR or 5YR, value of 2 or 3, and chroma of 1 or 2. The E horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 1 or 2.

The Bhs horizon has hue of 5YR or 7.5YR and chroma of 2 or 3. The Bs horizon has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 4 to 6. The B horizon is very fine sandy loam or fine sandy loam.

The 2C horizon has hue of 7.5YR or 10YR and value and chroma of 4 to 6. It is sand that has less than 10 percent gravel or has thin bands of gravel.

Au Gres Series

The Au Gres series consists of very deep, somewhat poorly drained soils on outwash plains and lake plains. These soils formed in sandy deposits. Permeability is rapid. Slopes range from 0 to 3 percent.

Au Gres soils are commonly adjacent to Croswell, Kinross, and Rubicon soils. Croswell soils do not have mottles in the upper part of the subsoil or in the subsurface layer. Kinross soils are poorly drained and are in the lower landscape positions. Rubicon soils are excessively drained and are on ridges and in the higher landscape positions.

Typical pedon of Au Gres sand, in an area of Kinross-Au Gres complex, 0 to 3 percent slopes; 1,800 feet west and 100 feet north of the southeast corner of sec. 22, T. 45 N., R. 2 W.

Oe—1 inch to 0; partially decomposed leaf litter; abrupt smooth boundary.

A—0 to 1 inch; black (10YR 2/1) sand, very dark gray (10YR 3/1) dry; weak fine granular structure; very friable; many fine to coarse roots; very strongly acid; abrupt wavy boundary.

E—1 to 5 inches; pinkish gray (7.5YR 6/2) sand; single grain; loose; common fine to coarse roots; strongly acid; abrupt wavy boundary.

Bs1—5 to 8 inches; yellowish red (5YR 5/6) sand; few fine faint yellowish red (5YR 4/6) mottles; weak medium subangular blocky structure; very friable;

common fine and few medium roots; strongly acid; clear wavy boundary.

Bs2—8 to 24 inches; strong brown (7.5YR 5/6) sand; common medium distinct strong brown (7.5YR 5/8) mottles; single grain; loose; few fine roots; medium acid; clear wavy boundary.

C1—24 to 36 inches; brownish yellow (10YR 6/6) sand; many coarse distinct strong brown (7.5YR 5/6) mottles; single grain; loose; very few fine roots; medium acid; gradual wavy boundary.

C2—36 to 60 inches; light yellowish brown (10YR 6/4) sand; common medium distinct yellowish brown (10YR 5/6) mottles; single grain; loose; medium acid.

The solum ranges from 20 to 45 inches in thickness. The content of gravel ranges from 0 to 5 percent.

The A horizon has hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 1 or 2, or it is neutral in hue. The E horizon has hue of 10YR or 7.5YR, value of 5 to 7, and chroma of 1 or 2. The Bs horizon has hue of 10YR, 7.5YR, or 5YR, value of 3 to 6, and chroma of 4 to 6. The C horizon has hue of 10YR or 7.5YR and value and chroma of 4 to 6.

Beavertail Series

The Beavertail series consists of poorly drained and very poorly drained, slowly permeable soils on ground moraines and glacial lake benches. These soils formed in loamy material. They are moderately deep to dense till. Slopes range from 0 to 2 percent.

Beavertail soils are commonly adjacent to Shelter, Markey, and Posen soils. Shelter soils are somewhat poorly drained and are in the higher landscape positions. Markey soils are very poorly drained and are in landscape positions similar to those of the Beavertail soils. They formed in organic material 16 to 50 inches deep over sand. Posen soils are well drained and are in the higher landscape positions.

Typical pedon of Beavertail muck, 500 feet south and 400 feet east of the northwest corner of sec. 11, T. 41 N., R. 6 E.

Oa—0 to 8 inches; sapric material, black (N 2/0) broken face and rubbed; about 10 percent fiber, less than 5 percent rubbed; moderate medium granular structure; friable; many very fine to coarse roots; about 5 percent gravel; moderately alkaline; abrupt wavy boundary.

Bw—8 to 16 inches; light yellowish brown (2.5Y 6/4) very gravelly fine sandy loam; common fine prominent brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; friable; common very fine and fine and few medium roots; about 40 percent gravel and 15 percent cobbles; strong effervescence; moderately alkaline; gradual wavy boundary.

Cg—16 to 29 inches; light brownish gray (2.5Y 6/2) very gravelly fine sandy loam; common fine prominent brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; firm; few very fine to medium roots; about 40 percent gravel and 15 percent cobbles; strong effervescence; moderately alkaline; gradual wavy boundary.

Cd—29 to 60 inches; pale brown (10YR 6/3) dense till that crushes to very gravelly fine sandy loam; few fine prominent strong brown (7.5YR 5/6) mottles; massive; firm; about 40 percent gravel and 15 percent cobbles; moderately alkaline; strong effervescence.

The surface layer has as much as 10 percent rock fragments. The B and C horizons have 30 to 45 percent gravel and 5 to 15 percent cobbles and stones. The textures are the very gravelly analogs of fine sandy loam, sandy loam, or loam.

The Oa horizon has hue of 7.5YR to 2.5Y or is neutral in hue. It has value of 2 or 3 and chroma of 0 or 1. Some pedons have an A horizon. This horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is 2 to 4 inches thick. The Bw and C horizons have hue of 2.5YR or 10YR, value of 4 to 6, and chroma of 2 to 4.

Biscuit Series

The Biscuit series consists of very deep, somewhat poorly drained soils on lake plains. These soils formed in loamy lacustrine sediments over clayey material. Permeability is moderate in the upper part of the profile and very slow in the lower part. Slopes range from 0 to 3 percent.

Biscuit soils are commonly adjacent to Gogomain, Pickford, and Rudyard soils. Gogomain and Pickford soils are poorly drained and are lower on the landscape than the Biscuit soils. Pickford soils are clayey. Rudyard soils also are clayey. They are in landscape positions similar to those of the Biscuit soils.

Typical pedon of Biscuit very fine sandy loam, 0 to 3 percent slopes, 1,900 feet east and 100 feet north of the southwest corner of sec. 32, T. 47 N., R. 1 W.

Ap—0 to 10 inches; dark gray (5YR 4/1) very fine sandy loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; common fine roots; strongly acid; abrupt smooth boundary.

E—10 to 11 inches; pinkish gray (5YR 6/2) very fine sandy loam; common medium prominent strong brown (7.5YR 5/6) mottles; weak fine subangular blocky structure; friable; few fine roots; slightly acid; abrupt broken boundary.

Bs1—11 to 12 inches; dark reddish brown (5YR 3/3 and 3/4) loamy very fine sand; common medium prominent strong brown (7.5YR 5/6) mottles; weak medium and thick platy structure parting to weak fine subangular blocky; friable; few fine roots; slightly acid; abrupt smooth boundary.

Bs2—12 to 16 inches; yellowish red (5YR 4/6) very fine sandy loam; many coarse prominent brown (7.5YR 5/4) mottles; weak medium and thick platy structure parting to weak fine subangular blocky; friable; few fine roots; neutral; clear smooth boundary.

E′—16 to 19 inches; brown (10YR 5/3) very fine sandy loam; few medium prominent strong brown (7.5YR 5/6) mottles; weak medium and thick platy structure parting to weak fine subangular blocky; friable; few fine roots; neutral; abrupt smooth boundary.

B/E—19 to 22 inches; about 85 percent reddish brown (5YR 5/4) silt loam (Bt); surrounded by brown (10YR 5/3) silt loam (E); weak medium and thick platy structure parting to weak fine subangular blocky; friable; few fine vesicular pores; neutral; abrupt smooth boundary.

2Bt—22 to 31 inches; reddish brown (2.5YR 5/4) clay; common medium distinct strong brown (7.5YR 5/6) and light gray (5Y 7/1) mottles; moderate medium and thick platy structure parting to moderate fine angular blocky; firm; common fine vesicular pores; common faint reddish brown (2.5YR 5/4) clay films on faces of peds; mildly alkaline; gradual smooth boundary.

2C—31 to 60 inches; reddish brown (2.5YR 5/4) clay that has a few thin bands of light gray (10YR 7/2) silt; moderate medium and thick platy structure parting to moderate fine angular blocky; firm; strong effervescence; moderately alkaline.

The solum ranges from 20 to 40 inches in thickness. The Ap horizon has hue of 10YR, 7.5YR, or 5YR, value of 3 or 4, and chroma of 1 or 2. The E horizon has hue of 10YR, 7.5YR, or 5YR, value of 5 or 6, and chroma of 1 to 3. It can occur as pockets or discontinuous layers in the Ap horizon.

The Bs horizon has hue of 7.5YR or 5YR, value of 3 to 5, and chroma of 3 to 6. It is very fine sandy loam, loamy very fine sand, or very fine sand. The E′ horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 1 to 3. It has the same textures as the Bs horizon.

The B part of the B/E horizon has hue of 10YR, 7.5YR, or 5YR and chroma of 4 to 6. The E part has colors similar to those of the E′ horizon. The B/E horizon is silt loam, very fine sandy loam, or loamy very fine sand. The 2Bt horizon has hue of 5YR or 2.5YR and value of 4 or 5. It is clay, silty clay, or silty clay loam.

The 2C horizon has hue of 5YR or 2.5YR and value of 4 or 5. It is clay or silty clay that has thin bands of silt and silt loam. The bands have hue of 5YR to 10YR, value of 5 to 7, and chroma of 2 or 3.

Bowers Series

The Bowers series consists of very deep, somewhat poorly drained soils on lake plains. These soils formed in stratified, loamy lacustrine deposits. Permeability is slow. Slopes range from 0 to 3 percent.

Bowers soils are commonly adjacent to Allendale, Soo, and Rudyard soils. Allendale and Rudyard soils are in landscape positions similar to those of the Bowers soils. Allendale soils formed in sandy material 20 to 40 inches deep over clayey lacustrine deposits. Rudyard soils have a higher content of clay than the Bowers soils. Soo soils are poorly drained and are in the lower landscape positions.

Typical pedon of Bowers silt loam, 0 to 3 percent slopes, 300 feet north and 2,900 feet west of the southeast corner of sec. 15, T. 44 N., R. 3 W.

Ap—0 to 8 inches; brown (10YR 4/3) silt loam, light gray (10YR 7/2) dry; moderate medium subangular blocky structure; friable; many fine to coarse roots; few medium pores; neutral; abrupt smooth boundary.

Bt—8 to 16 inches; reddish brown (5YR 5/3) silty clay loam; common coarse prominent strong brown (7.5YR 5/8) and common medium distinct brown (7.5YR 5/2) mottles; moderate coarse angular blocky structure; firm; few fine to coarse roots; common medium and fine pores; few faint reddish gray (5YR 5/2) clay films on faces of peds; neutral; clear smooth boundary.

BC—16 to 26 inches; brown (5YR 5/4) silty clay loam stratified with pinkish gray (7.5YR 6/2) silt loam; common medium prominent strong brown (7.5YR 5/8) and brownish yellow (10YR 6/8) and common fine prominent light greenish gray (5GY 7/1) mottles; moderate medium angular blocky structure; firm; few fine roots; common medium and fine pores; strong effervescence; moderately alkaline; clear irregular boundary.

C—26 to 60 inches; brown (7.5YR 5/4) and reddish brown (5YR 5/3), stratified silty clay loam and silt loam; few fine prominent yellowish brown (10YR 5/8) and light greenish gray (5GY 7/1) mottles; weak thin platy fragments grading to massive with increasing depth; firm; common fine pores; strong effervescence; moderately alkaline.

The solum ranges from 18 to 30 inches in thickness. The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 2 or 3. Some pedons have an A horizon. This horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2. Some pedons have an E horizon. This horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 or 3. The Ap, A, and E horizons are dominantly silt loam, but the range includes silty clay loam. The Bt horizon has hue of 5YR or 7.5YR and chroma of 3 or 4. Some pedons have a B/E horizon. The C horizon has hue of 7.5YR or 5YR and chroma of 3 or 4. It is stratified silt loam, silty clay loam, or silty clay.

Burleigh Series

The Burleigh series consists of very deep, poorly drained soils on lake plains. These soils formed in sandy deposits underlain by stratified, loamy deposits. Permeability is rapid in the upper part of the profile and moderately slow in the lower part. Slopes are less than 2 percent.

The Burleigh soils in this county are taxadjuncts because they are brighter colored throughout than is defined as the range for the series and because they do not have carbonates. These differences, however, do not affect the use and management of the soils.

Burleigh soils are commonly adjacent to Deford, Ermatinger, and Shelter soils. Deford and Ermatinger soils are in landscape positions similar to those of the Burleigh soils. Deford soils do not have a loamy substratum. Ermatinger soils formed in stratified, loamy deposits. Shelter soils are somewhat poorly drained and formed in loamy deposits in the higher landscape positions.

Typical pedon of Burleigh loamy fine sand, 100 feet east and 50 feet north of the southwest corner of sec. 24, T. 46 N., R. 1 E.

Ap—0 to 7 inches; very dark gray (10YR 3/1) loamy fine sand, gray (10YR 5/1) dry; weak medium subangular blocky structure; very friable; many fine and very fine, few medium, and very few coarse roots; slightly acid; abrupt wavy boundary.

Cg—7 to 13 inches; dark gray (10YR 4/1) loamy fine sand; few fine prominent olive brown (2.5Y 4/4) mottles; weak coarse subangular blocky structure; very friable; common fine and very fine and few medium roots; few small pieces of charcoal; slightly acid; abrupt broken boundary.

C—13 to 21 inches; yellowish brown (10YR 5/4) fine sand; many coarse distinct brown (7.5YR 4/4) mottles; weak coarse subangular blocky structure; very friable; few fine and very fine and very few medium roots; neutral; clear smooth boundary.

2Cg—21 to 60 inches; light brownish gray (10YR 6/2) and light brown (7.5YR 6/4), stratified fine sand, very fine sand, and silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; massive; friable; few very fine and fine roots; common black (10YR 2/1) organic stains; neutral.

Depth to the 2C horizon is 20 to 35 inches. The Ap horizon has value of 2 or 3. Some pedons have an A horizon of mucky fine sand or mucky loamy fine sand. The Cg horizon has value of 4 or 5 and chroma of 1 or 2. It is fine sand or loamy fine sand. The C horizon has value of 5 or 6 and chroma of 3 or 4. It is fine sand or loamy fine sand. The 2C horizon has value of 4 to 6 and chroma of 1 to 4. It is stratified fine sand, very fine sand, loamy very fine sand, or silt loam.

Carbondale Series

The Carbondale series consists of very deep, very poorly drained soils that formed in organic material more than 51 inches thick. These soils are in depressions and drainageways on lake plains, till plains, and outwash plains. Permeability is moderately slow to moderately rapid. Slopes range from 0 to 2 percent.

Carbondale soils are commonly adjacent to Au Gres, Markey, and Pickford soils. The somewhat poorly drained Au Gres soils formed in sandy deposits in the higher landscape positions. Markey soils formed in 16 to 50 inches of organic material. The poorly drained Pickford soils formed in clayey deposits in the slightly higher landscape positions.

Typical pedon of Carbondale muck, in an area of Markey and Carbondale mucks; 860 feet north and 790 feet east of the southwest corner of sec. 12, T. 46 N., R. 1 W.

Oa1—0 to 14 inches; sapric material, black (10YR 2/1) broken face, rubbed, and pressed; about 40 percent fiber, 2 percent rubbed; moderate fine subangular blocky structure; friable; primarily herbaceous fibers; many fine and medium roots; medium acid; abrupt smooth boundary.

Oa2—14 to 33 inches; sapric material, dark reddish brown (5YR 2/2) broken face, rubbed, and pressed; about 85 percent fiber, 15 percent rubbed; weak very thick platy structure; friable; primarily herbaceous material; few medium and coarse roots; medium acid; gradual smooth boundary.

Oe1—33 to 43 inches; hemic material, dark reddish brown (5YR 3/2) broken face and pressed, dark reddish brown (5YR 2/2) rubbed; about 95 percent fiber, 70 percent rubbed; massive; friable; primarily herbaceous fibers and occasional woody fragments; medium acid; abrupt wavy boundary.

Oe2—43 to 60 inches; hemic material, very dark grayish brown (10YR 3/2) broken face and rubbed, very dark brown (10YR 2/2) pressed; about 90 percent fiber, 40 percent rubbed; massive; friable; primarily herbaceous fibers; slightly acid.

The organic layers are more than 51 inches thick. The organic material has hue of 10YR, 7.5YR, or 5YR, value of 2 or 3, and chroma of 1 or 2, or it is neutral in hue and has value of 2 or 3. Wood fragments, from 1 to several inches in diameter, are throughout some pedons. Some pedons have a thin, 1- to 3-inch fibric layer on the surface. The surface tier contains sapric or hemic material or both. It commonly is derived from herbaceous plants, but in some pedons a moderate amount of the material is woody. The bottom tier commonly is dominated by hemic material, and in some pedons the entire layer is hemic material. More than 10 inches of the subsurface and bottom tiers is hemic material.

Chippeny Series

The Chippeny series consists of moderately deep and deep, very poorly drained soils that formed in organic material 20 to 50 inches deep over limestone bedrock. These soils are in depressions on bedrock-controlled ground moraines. Permeability is moderately slow in the organic material and slow to moderate in the mineral material. Slopes range from 0 to 2 percent.

Chippeny soils are commonly adjacent to the loamy Ensign, Potagannissing, and Ruse soils. Ensign and Potagannissing soils are somewhat poorly drained and are in the slightly higher landscape positions. Ruse soils are poorly drained and are in landscape positions similar to those of the Chippeny soils.

Typical pedon of Chippeny muck, 2,500 feet east and 400 feet south of the northwest corner of sec. 3, T. 41 N., R. 6 E.

Oa1—0 to 6 inches; sapric material, black (N 2/0) broken face, rubbed, and pressed; about 40 percent fiber, 10 percent rubbed; weak fine granular structure; slightly sticky; herbaceous fibers; many fine and medium roots; neutral; very friable; abrupt smooth boundary.

Oa2—6 to 20 inches; sapric material, black (10YR 2/1) broken face, rubbed, and pressed; about 10 percent fiber, 2 percent rubbed; strong very coarse platy structure; friable; herbaceous fibers; few fine roots; neutral; abrupt smooth boundary.

Oa3—20 to 25 inches; sapric material, dark brown (7.5YR 3/2) broken face, dark brown (10YR 3/2) rubbed and pressed; about 25 percent fiber, 2 percent rubbed; moderate medium and coarse platy structure; very friable; herbaceous fibers; neutral; gradual smooth boundary.

Cg—25 to 35 inches; gray (10YR 6/1) very gravelly sandy loam; massive; friable; about 40 percent gravel; slight effervescence; mildly alkaline; abrupt smooth boundary.

2R—35 inches; limestone bedrock.

The depth to limestone bedrock is 20 to 50 inches. The organic material has chroma of 0 to 3. It consists primarily of sapric and herbaceous fibers, but some pedons have hemic layers with woody fibers.

The Cg horizon has value of 4 to 6 and chroma of 1 or 2. It is sandy loam, fine sandy loam, silt loam, or the gravelly or very gravelly analogs of those textures. The content of gravel ranges from 0 to 50 percent. The thickness of this horizon is less than half that of the overlying organic material.

Croswell Series

The Croswell series consists of very deep, moderately well drained soils on stream terraces, outwash plains, and lake plains. These soils formed in sandy deposits. Permeability is rapid. Slopes range from 0 to 6 percent.

Croswell soils are commonly adjacent to Au Gres, Markey, and Rubicon soils. Au Gres soils are somewhat poorly drained and are in the slightly lower landscape positions. Rubicon soils are excessively drained and are on ridges and in the higher landscape positions. Markey soils are very poorly drained and are in depressions and drainageways. They formed in organic material 16 to 50 inches deep over sandy deposits.

Typical pedon of Croswell sand, 0 to 3 percent slopes, 1,600 feet north and 600 feet east of the southwest corner of sec. 6, T. 45 N., R. 1 W.

Oe—2 inches to 0; black (N 2/0), partially decomposed leaf litter.

E—0 to 2 inches; brown (7.5YR 5/2) sand; weak fine subangular blocky structure; friable; many fine to coarse roots; strongly acid; abrupt wavy boundary.

Bs1—2 to 6 inches; strong brown (7.5YR 4/6) sand; weak medium subangular blocky structure; friable; many fine and medium and few coarse roots; about 5 percent gravel; strongly acid; clear wavy boundary.

Bs2—6 to 17 inches; strong brown (7.5YR 5/6) sand; weak fine subangular blocky structure; very friable; few fine and medium roots; about 15 percent ortstein fragments; dark reddish brown (5YR 3/4) stains along root channels; about 5 percent gravel; medium acid; gradual wavy boundary.

BC—17 to 29 inches; yellowish brown (10YR 5/6) sand; weak fine subangular blocky structure; very friable; few fine roots; dark reddish brown (5YR 3/4) stains along root channels; medium acid; gradual wavy boundary.

C1—29 to 46 inches; light yellowish brown (10YR 6/4) sand; few fine prominent strong brown (7.5YR 5/6) mottles; single grain; loose; few fine roots; medium acid; clear wavy boundary.

C2—46 to 60 inches; brownish yellow (10YR 6/6) sand; many coarse prominent strong brown (7.5YR 5/6 and 5/8) mottles; single grain; loose; medium acid.

The thickness of the solum ranges from 20 to 40 inches. Some pedons have an A horizon. This horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2. The E horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 1 or 2. The Bs horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 to 6. The C horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 4 to 6.

Dawson Series

The Dawson series consists of very deep, very poorly drained soils that formed in organic material 16 to 50 inches deep over sandy deposits. These soils are in closed depressions on outwash plains and lake plains. Permeability is moderately slow to moderately rapid in the organic material and rapid in the sandy material. Slopes range from 0 to 2 percent.

Dawson soils are commonly adjacent to Au Gres, Loxley, and Rousseau soils. Au Gres and Rousseau soils are sandy. Au Gres soils are somewhat poorly drained and are on low knolls and ridges. Rousseau soils are well drained and are on knolls, ridges, and uplands. Loxley soils formed in more than 51 inches of organic material.

Typical pedon of Dawson peat, in an area of Dawson and Loxley peats; 200 feet south and 1,150 feet west of the northeast corner of sec. 13, T. 45 N., R. 1 W.

Oi—0 to 6 inches; fibric material, yellowish brown (10YR 5/4) broken face and very pale brown (10YR 7/4) rubbed and pressed; about 95 percent fiber undisturbed and 90 percent rubbed; massive; primarily very friable; sphagnum moss fibers; many roots; extremely acid; abrupt smooth boundary.

Oa1—6 to 11 inches; sapric material, dark reddish brown (5YR 2/2) broken face and pressed, black (5YR 2/1) rubbed; about 35 percent fiber, 15 percent rubbed; weak medium platy structure parting to weak medium subangular blocky; very friable; primarily herbaceous fibers and few woody fragments; many roots; extremely acid; clear smooth boundary.

Oa2—11 to 18 inches; sapric material, dark reddish brown (5YR 2/2) and black (5YR 2/1) rubbed and pressed; about 5 percent fiber, 1 percent rubbed; massive; firm; primarily herbaceous fibers; common fine roots; extremely acid; clear smooth boundary.

AE—18 to 19 inches; dark brown (10YR 4/2) and pinkish gray (10YR 6/2) fine sand; single grain; loose; very strongly acid; abrupt smooth boundary.

Bhs—19 to 22 inches; dark reddish brown (5YR 3/2) loamy fine sand; single grain; loose; very strongly acid; clear wavy boundary.

Bs1—22 to 32 inches; dark brown (7.5YR 3/4) fine sand; single grain; loose; strongly acid; clear wavy boundary.

Bs2—32 to 60 inches; strong brown (7.5YR 5/6) fine sand; single grain; loose; strongly acid.

Depth to the sandy material ranges from 16 to 50 inches. The organic material is primarily herbaceous and has occasional woody fragments. It is extremely acid.

The surface tier has hue of 10YR, 7.5YR, or 5YR, value of 2 to 6, and chroma of 1 to 4. The upper part is living sphagnum, but the lower part has undergone some decomposition. The sapric material has hue of 10YR, 7.5YR, or 5YR, value of 2 to 4, and chroma of 1 to 3. The material is dominantly sapric, but some pedons have layers of hemic material less than 10 inches thick.

The AE horizon has value of 4 to 6 and chroma of 1 or 2. It is fine sand, sand, or the mucky analogs of those textures. The Bhs horizon has hue of 5YR or 7.5YR and chroma of 2 or 3. The Bs horizon has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 4 to 6. The B horizon is fine sand, loamy fine sand, or sand. Some pedons have a C horizon. This horizon has hue of 5YR or 2.5Y, value of 3 to 6, and chroma of 2 to 6. It is sand or fine sand.

Deer Park Series

The Deer Park series consists of very deep, excessively drained soils on beach ridges and stabilized sand dunes along the Great Lakes. These soils formed in deposits of sand or fine sand. Permeability is rapid. Slopes range from 0 to 50 percent.

Deer Park soils are commonly adjacent to Au Gres, Dawson, and Kinross soils. Au Gres soils are somewhat poorly drained and are in the lower landscape positions. Dawson soils formed in organic material 16 to 50 inches deep over sandy deposits. They are in the lower landscape positions. Kinross soils are poorly drained and are in depressions and swales.

Typical pedon of Deer Park fine sand, 0 to 15 percent slopes, 400 feet west and 100 feet south of the northeast corner of sec. 16, T. 49 N., R. 7 W.

A—0 to 1 inch; very dark gray (10YR 3/1) fine sand, dark gray (10YR 4/1) dry; weak fine granular structure; very friable; many very fine, common fine, and few medium and coarse roots; strongly acid; abrupt smooth boundary.

E—1 to 8 inches; light brownish gray (10YR 6/2) fine sand; single grain; loose; many very fine, common fine, and few medium and coarse roots; strongly acid; clear wavy boundary.

Bs1—8 to 31 inches; yellowish brown (10YR 5/6) fine sand; single grain; loose; many very fine, few fine, and very few medium and coarse roots; strongly acid; gradual wavy boundary.

Bs2—31 to 51 inches; reddish yellow (7.5YR 6/6) fine sand; single grain; loose; common very fine and few fine roots; some pockets of weakly cemented strong brown (7.5YR 4/6, 7.5YR 5/6, and 7.5YR 5/8) ortstein; medium acid; gradual wavy boundary.

C—51 to 60 inches; light brown (7.5YR 6/4) sand; single grain; loose; few very fine roots; medium acid.

The solum is 20 to 55 inches thick. It is sand or fine sand.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The E horizon has value of 5 or 6 and chroma of 1 to 3. Some pedons have an AE horizon that has colors similar to those of the A and E horizons. The Bs horizon has chroma of 4 to 6 and value 1 unit darker than that of the E horizon. In some pedons the Bs horizon has pockets of ortstein. The C horizon has hue of 7.5YR or 10YR and chroma of 3 to 6.

Deford Series

The Deford series consists of very deep, poorly drained soils that formed in sandy deposits on outwash plains and lake plains. Permeability is rapid. Slopes range from 0 to 2 percent.

Deford soils are commonly adjacent to Burleigh, Rousseau, and Wainola soils. Burleigh soils are loamy in the lower part of the substratum. They are in landscape positions similar to those of the Deford soils. Rousseau soils are well drained and moderately well drained and are on ridges and knolls. Wainola soils are somewhat poorly drained and are in the slightly higher landscape positions.

Typical pedon of Deford fine sand, 600 feet south and 200 feet west of the northeast corner of sec. 8, T. 41 N., R. 3 E.

A—0 to 4 inches; very dark gray (10YR 3/1) and dark grayish brown (10YR 4/2) fine sand, gray (10YR 5/1) and light brownish gray (10YR 6/2) dry; weak fine granular structure parting to single grain; very friable; many very fine and fine and few medium roots; neutral; abrupt wavy boundary.

C1—4 to 18 inches; light yellowish brown (10YR 6/4) fine sand; few medium prominent strong brown (7.5YR 5/6 and 5/8) mottles in root channels; single grain; loose; few fine roots; mildly alkaline; gradual wavy boundary.

C2—18 to 32 inches; pale brown (10YR 6/3) fine sand; few medium prominent strong brown (7.5YR 5/6) mottles in root channels; single grain; loose; few fine roots; mildly alkaline; gradual wavy boundary.

Cg—32 to 60 inches; grayish brown (10YR 5/2) fine sand; single grain; loose; mildly alkaline.

The A horizon has value of 2 or 3 and chroma of 1 or 2. The C horizon has value of 5 to 7 and chroma of 1 to 4. It is fine sand or loamy fine sand.

Dora Series

The Dora series consists of very deep, very poorly drained soils in depressions and drainageways on lake plains. These soils formed in organic material 16 to 51 inches deep over clayey lacustrine deposits. Permeability is moderate or moderately rapid in the organic material and very slow in the underlying clayey deposits. Slopes range from 0 to 2 percent.

Dora soils are commonly adjacent to the poorly drained Pickford and somewhat poorly drained Rudyard soils in the slightly higher landscape positions. Both of the adjacent soils are clayey.

Typical pedon of Dora muck, 750 feet west and 20 feet north of the southeast corner of sec. 27, T. 46 N., R. 1 W.

Oa1—0 to 12 inches; sapric material, black (N 2/0) broken face, black (5YR 2/1) pressed and rubbed; about 15 percent fiber, 3 percent rubbed; weak medium subangular blocky structure parting to weak medium granular; very friable; primarily herbaceous fibers; common fine to coarse roots; very strongly acid; abrupt smooth boundary.

Oa2—12 to 19 inches; sapric material, very dark gray (10YR 3/1) broken face, black (5YR 2/1) rubbed and pressed; about 70 percent fiber, 10 percent rubbed; massive; friable; primarily herbaceous fibers; medium acid; abrupt smooth boundary.

Oe—19 to 25 inches; hemic material, dark reddish brown (5YR 2/2) broken face, rubbed, and pressed; about 90 percent fiber, 30 percent rubbed; moderate thin platy structure; friable; primarily herbaceous fibers; medium acid; abrupt smooth boundary.

Cg—25 to 33 inches; gray (5Y 6/1) silty clay loam; common medium prominent light red (2.5YR 6/6) and common fine prominent yellowish brown (10YR 5/6) mottles; massive; firm; neutral; abrupt smooth boundary.

C—33 to 60 inches; reddish brown (2.5YR 5/4) silty clay; many medium prominent gray (5YR 5/1), common medium prominent yellowish brown (10YR 5/6), common fine prominent olive (5Y 5/3), and few fine prominent light greenish gray (5GY 7/1) mottles; massive; firm; neutral.

Depth to the mineral layers is typically 20 to 30 inches but ranges from 16 to 50 inches. The organic part is dominantly sapric material. Some pedons have layers of hemic material with a combined thickness of less than 10 inches. The organic deposits are typically herbaceous, but some pedons have woody fragments that amount to less than 15 percent of the volume. The organic layers have hue of 10YR, 7.5YR, or 5YR, value of 2 or 3, and chroma of 1 or 2 or are neutral in hue and have value of 2 or 3.

The Cg horizon has hue of 5Y or 10YR, value of 4 to 6, and chroma of 1 or 2. It is silty clay loam, silty clay, or clay.

The C horizon has hue of 10YR, 7.5YR, 5YR, or 2.5YR, value of 4 to 6, and chroma of 1 to 6. It is silty clay loam, silty clay, or clay.

Duel Series

The Duel series consists of moderately deep, well drained soils on ground moraines and outwash plains. These soils formed in sandy material over limestone bedrock. Permeability is moderate to rapid. Slopes range from 1 to 6 percent.

Duel soils are commonly adjacent to Kalkaska, Menominee, Shelter, and Summerville soils. The adjacent soils are in landscape positions similar to those of the Duel soils. Kalkaska and Menominee soils are not underlain by limestone bedrock. Shelter soils are somewhat poorly drained and do not have bedrock within a depth of 40 inches. Summerville soils are finer textured than the Duel soils.

Typical pedon of Duel sand, in an area of Duel-Rock outcrop complex, 1 to 6 percent slopes; 2,000 feet west and 50 feet north of the southeast corner of sec. 14, T. 42 N., R. 2 E.

A—0 to 3 inches; black (N 2/0) sand, dark gray (N 4/0) dry; grains of brown (7.5YR 5/2) sand; weak fine granular structure parting to single grain; loose; common very fine to coarse roots; slightly acid; abrupt wavy boundary.

E—3 to 9 inches; brown (7.5YR 5/2) loamy sand; single grain; loose; common very fine to coarse roots; slightly acid; abrupt wavy boundary.

Bs1—9 to 21 inches; dark reddish brown (5YR 3/4) loamy sand; single grain; loose; common very fine to coarse roots; about 10 percent weakly cemented ortstein; slightly acid; clear irregular boundary.

Bs2—21 to 30 inches; dark brown (7.5YR 4/4) loamy coarse sand; single grain; loose; few very fine to coarse roots; neutral; abrupt wavy boundary.

2C—30 to 38 inches; pale brown (10YR 6/3) very gravelly very fine sandy loam; massive; firm; few very fine to coarse roots; about 35 percent gravel and 1 percent cobbles; strong effervescence; moderately alkaline; abrupt smooth boundary.

3R—38 inches; limestone bedrock.

The depth to limestone bedrock is 20 to 40 inches. The solum is sand or loamy sand. In the solum, the content of gravel is 0 to 5 percent and the content of cobbles is 0 to 2 percent. The 2C horizon has 1 to 5 percent cobbles and 30 to 45 percent gravel.

The A horizon has hue of 7.5YR or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 3. The E horizon has hue of 5YR, 7.5YR, or 10YR, value of 5 or 6, and chroma of 2 or 3. The Bs horizon has value of 3 to 5 and chroma of 4 to 6. Some pedons have a Bhs horizon less than 3 inches thick. This horizon has hue of 5YR or 7.5YR and value and chroma of 2 or 3. The 2C horizon has hue of 5YR, 7.5YR, or 10YR, value of 5 or 6, and chroma of 1 to 3. It is very gravelly sandy loam, very gravelly fine sandy loam, and very gravelly very fine sandy loam.

Emmet Series

The Emmet series consists of very deep, well drained soils on ground moraines. These soils formed in loamy material. Permeability is moderate. Slopes range from 1 to 15 percent.

The Emmet soils in this county have a darker surface layer than is defined as the range for the series. This difference, however, does not affect the use and management of the soils.

Emmet soils are commonly adjacent to Kalkaska, Longrie, and Menominee soils. The adjacent soils are in landscape positions similar to those of the Emmet soils. Kalkaska soils are sandy throughout. Longrie soils are underlain by limestone bedrock. Menominee soils formed in sandy material 20 to 40 inches deep over loamy till.

Typical pedon of Emmet sandy loam, 1 to 6 percent slopes, 2,100 feet south and 75 feet east of the northwest corner of sec. 27, T. 44 N., R. 3 W.

Ap—0 to 6 inches; black (N 2/0) sandy loam, dark gray (10YR 4/1) dry; moderate medium granular structure; friable; many fine and medium roots; about 3 percent gravel; neutral; abrupt wavy boundary.

Bs—6 to 14 inches; brown (7.5YR 4/4) sandy loam; moderate medium subangular blocky structure; friable; common fine and medium roots; about 3 percent gravel; neutral; clear wavy boundary.

Bt1—14 to 21 inches; reddish brown (5YR 4/3) sandy loam; moderate medium and coarse subangular blocky structure; friable; few fine roots; many fine vesicular pores; few faint reddish brown (5YR 5/3) clay films on faces of peds; about 10 percent gravel and 3 percent cobbles; neutral; clear wavy boundary.

Bt2—21 to 29 inches; reddish brown (5YR 4/4) sandy loam; moderate medium subangular blocky structure; friable; few fine roots; many fine vesicular pores; few faint reddish brown (5YR 5/3) clay flows on faces of peds; about 10 percent gravel and 3 percent cobbles; neutral; clear wavy boundary.

C—29 to 60 inches; reddish brown (5YR 5/3) sandy loam and thin lenses of brown (7.5YR 4/4) loamy sand; massive; friable; about 10 percent gravel and 3 percent cobbles; slight effervescence; mildly alkaline.

The solum ranges from 24 to 40 inches in thickness. The content of gravel ranges from 5 to 15 percent. The content of cobbles ranges from 0 to 10 percent.

The Ap horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1, or it is neutral in hue and has value of 2 or 3. Some pedons have an A horizon. This horizon has hue of 7.5YR or 10YR or is neutral in hue. It has value of 3 and chroma of 0 to 2.

The Bs horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is sandy loam or loamy sand. The Bt horizon has hue of 5YR, 7.5YR, or 10YR and value of 4 or 5. It is sandy loam or fine sandy loam. Some pedons have an E′ horizon above the Bt horizon. The E′ horizon has hue of 7.5YR, value of 5, and chroma of 2 or 3. It is sandy loam.

The C horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 3 or 4. It is sandy loam or fine sandy loam and has lenses of loamy sand.

Ensign Series

The Ensign series consists of shallow, somewhat poorly drained, moderately permeable soils on ground moraines and glacial lake benches. These soils formed in loamy material underlain by limestone bedrock. Slopes range from 0 to 3 percent.

The Ensign soils in this county are taxadjuncts to the series because they do not have dominant colors with chroma of 2 or less in the subsoil. This difference, however, does not affect the use and management of the soils.

Ensign soils are commonly adjacent to Potagannissing and Shelter soils. Potagannissing soils are less than 10 inches deep over limestone bedrock. They are in landscape positions similar to those of the Ensign soils. Shelter soils do not have bedrock within a depth of 40 inches. They are in the slightly higher landscape positions.

Typical pedon of Ensign silt loam, 0 to 3 percent slopes, rocky, 2,000 feet north and 50 feet west of the southeast corner of sec. 12, T. 41 N., R. 5 E.

A—0 to 4 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; moderate fine granular structure; friable; many very fine to medium roots; about 10 percent gravel and 2 percent cobbles; mildly alkaline; gradual wavy boundary.

A/B—4 to 8 inches; very dark gray (10YR 3/1) (A) and light olive brown (2.5Y 5/4) (B) silt loam; few fine prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; many fine and medium roots; about 10 percent gravel and 2 percent cobbles; slight effervescence; moderately alkaline; clear wavy boundary.

Bw—8 to 13 inches; light olive brown (2.5Y 5/4) silt loam; common fine prominent yellowish brown (10YR 5/6) and light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable; common very fine to medium roots; about 10 percent gravel and 2 percent cobbles; violent effervescence; moderately alkaline; abrupt smooth boundary.

2R—13 inches; limestone bedrock.

The depth to bedrock ranges from 10 to 20 inches. The content of rock fragments ranges from 0 to 35 percent. The profile is silt loam, fine sandy loam, loam, or the stony, cobbly, or gravelly analogs of those textures.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 or 2. The A part of the A/B horizon has colors similar to those of the A horizon. The B part and the Bw horizon have value of 4 to 6 and chroma of 3 or 4. Some pedons have a thin layer of residuum directly above the bedrock.

Ermatinger Series

The Ermatinger series consists of very deep, poorly drained, moderately permeable soils on the former flood plains along glacial rivers. These soils formed in stratified, loamy deposits. Slopes range from 0 to 2 percent.

Ermatinger soils are commonly adjacent to Pickford, Biscuit, and Wega soils. Pickford soils formed in clayey deposits. They are poorly drained and are in landscape positions similar to those of the Ermatinger soils. Biscuit soils formed in loamy deposits over clayey deposits. They are on low ridges and knobs. Biscuit and Wega soils are somewhat poorly drained. Wega soils are on low ridges.

Typical pedon of Ermatinger silt loam, 1,700 feet east and 400 feet north of the southwest corner of sec. 26, T. 47 N., R. 1 E.

Ap—0 to 8 inches; black (10YR 2/1) silt loam, light brownish gray (10YR 6/2) dry; moderate medium subangular blocky structure; friable; common medium roots; neutral; clear smooth boundary.

Cg1—8 to 12 inches; grayish brown (2.5Y 5/2) silt loam; few fine prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; many fine and medium roots; common worm channels; neutral; abrupt wavy boundary.

Cg2—12 to 21 inches; gray (10YR 5/1) very fine sandy loam and loamy very fine sand; few fine prominent strong brown (7.5YR 4/6) and few fine prominent yellowish brown (10YR 5/8) mottles in matrix and root channels; massive; friable; common fine and medium roots; few fine vesicular pores; common black (N 2/0) organic stains and charcoal fragments; mildly alkaline; clear smooth boundary.

Cg3—21 to 60 inches; brown (7.5YR 5/2) very fine sandy loam and loamy very fine sand; common fine distinct strong brown (7.5YR 4/6) and many medium prominent yellowish brown (10YR 5/4) mottles; massive; friable; few fine roots in the upper 15 inches; few fine vesicular pores; common dark grayish brown (10YR 4/2) organic stains; mildly alkaline.

Some pedons have thin organic layers or buried logs below a depth of 20 inches.

The Ap horizon has value of 2 or 3 and chroma of 1 or 2. The C horizon has hue of 2.5Y, 5Y, 7.5YR, or 10YR, value of 4 to 6, and chroma of 1 to 4. It is silt loam, loamy very fine sand, or very fine sandy loam. Some pedons have thin strata of very fine sand, fine sand, or loamy fine sand.

Fibre Series

The Fibre series consists of very deep, poorly drained soils on lake plains and outwash plains. These soils formed in sandy sediments and in the underlying clayey deposits. Permeability is moderately rapid and rapid in the upper part and very slow in the clayey material. Slopes range from 0 to 2 percent.

Fibre soils are commonly adjacent to Allendale, Soo, Pickford, and Rudyard soils. Allendale soils are somewhat poorly drained. Soo, Pickford, and Rudyard soils do not have a sandy subsurface layer or subsoil. Soo and Pickford soils are poorly drained and are in landscape positions similar to those of the Fibre soils. Rudyard and Allendale soils are in the slightly higher landscape positions.

Typical pedon of Fibre muck, 2,200 feet west and 1,300 feet south of the northeast corner of sec. 10, T. 44 N., R. 2 W.

Oa—0 to 5 inches; black (N 2/0) muck; weak fine granular structure; friable; many fine to coarse roots; very strongly acid; abrupt smooth boundary.

E—5 to 13 inches; brown (10YR 5/3) sand; few fine faint brown (10YR 4/3) mottles; weak fine subangular blocky structure; very friable; common fine and medium roots; very strongly acid; abrupt wavy boundary.

Bs—13 to 17 inches; dark brown (7.5YR 3/4) sand; common medium distinct dark brown (7.5YR 3/2) mottles; weak fine subangular blocky structure; very friable; common fine and medium roots; few distinct cracked coatings on sand grains; neutral; abrupt smooth boundary.

E/B—17 to 19 inches; about 60 percent reddish brown (5YR 5/3) loamy sand (E); surrounding peds of reddish brown (5YR 5/4) fine sandy loam (B); common medium prominent strong brown (7.5YR 5/6) and few medium prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; firm; few fine roots; neutral; abrupt smooth boundary.

2Bt—19 to 27 inches; reddish brown (5YR 5/4) clay; common medium distinct yellowish red (5YR 4/6) and common medium prominent greenish gray (5G 5/1) mottles; moderate very fine subangular blocky structure; firm; few fine roots; few faint reddish brown (5YR 5/3) clay films on faces of peds; many fine and very fine vesicular pores; mildly alkaline; clear wavy boundary.

2C—27 to 60 inches; stratified, reddish brown (5YR 4/4 and 5/3) clay that has thin bands of pinkish gray (7.5YR 6/2) silt; common medium distinct light reddish brown (5YR 6/3) mottles; moderate medium platy structure parting to moderate very fine subangular blocky; firm; few fine roots; common fine and very fine vesicular pores; strong effervescence; moderately alkaline.

The thickness of the solum ranges from 20 to 35 inches. The total thickness of the upper sandy layers ranges from 15 to 25 inches. These layers are fine sand, sand, or loamy sand. The content of gravel ranges from 0 to 5 percent.

The Oa horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2, or it is neutral in hue and has value of 2 or 3. The Ap or A horizon, if it occurs, has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 or 2. The E horizon has hue of 10YR or 7.5YR, value of 5 to 7, and chroma of 2 or 3.

The Bs horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 4 to 6. Some pedons have a Bhs horizon. This horizon has hue of 7.5YR to 10YR and value and chroma of 2 or 3.

The E part of the E/B horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 2 or 3. It is loamy sand, fine sand, sand, or loamy fine sand. The B part has value of 4 or 5. It is sandy loam, silt loam, or fine sandy loam. The 2Bt horizon has value of 4 or 5. It is clay, silty clay, or silty clay loam.

The 2C horizon is clay or silty clay that has thin bands of silt or silt loam. The bands have hue of 5YR or 7.5YR, value of 5 to 7, and chroma of 2 or 3. Some pedons do not have thin bands.

Gaastra Series

The Gaastra series consists of very deep, somewhat poorly drained soils in areas of remnant glacial, eolian, and delta deposits. These soils formed in loamy deposits. Permeability is moderately slow. Slopes range from 0 to 3 percent.

Gaastra soils are commonly adjacent to Alcona, Markey, and Gogomain soils. Alcona soils are moderately well drained and are higher on the landscape than the Gaastra soils. Gogomain and Markey soils are in the lower landscape positions. Gogomain soils are poorly drained and are underlain by clay. Markey soils are very poorly drained. They formed in organic material 16 to 50 inches deep over sandy deposits.

Typical pedon of Gaastra silt loam, 0 to 3 percent slopes, 700 feet east and 800 feet north of the southwest corner of sec. 18, T. 45 N., R. 1 E.

Oa—2 inches to 0; well decomposed leaf litter and live roots.

E—0 to 8 inches; 70 percent brown (7.5YR 5/2) and 30 percent pinkish gray (7.5YR 6/2) silt loam; few fine distinct strong brown (7.5YR 5/6) mottles; moderate medium subangular blocky structure; friable; many very fine to medium roots; many fine vesicular pores; medium acid; clear smooth boundary.

Bs1—8 to 14 inches; reddish brown (5YR 4/3) very fine sandy loam; common medium and coarse distinct yellowish red (5YR 4/6) mottles; moderate medium subangular blocky structure; friable; many very fine to medium roots; many fine vesicular pores; medium acid; clear wavy boundary.

Bs2—14 to 20 inches; strong brown (7.5YR 5/6) very fine sandy loam; many coarse prominent yellowish red (5YR 5/8) and red (2.5YR 4/6) mottles; moderate medium subangular blocky structure; friable; common medium roots; many fine vesicular pores; medium acid; gradual wavy boundary.

E′—20 to 36 inches; light reddish brown (5YR 6/3) loamy very fine sand; many coarse distinct yellowish red (5YR 4/6) and strong brown (7.5YR 5/6) mottles; moderate medium and thick platy structure; friable; few fine roots; many fine vesicular pores; slightly acid; diffuse wavy boundary.

B/E—36 to 41 inches; about 90 percent reddish brown (5YR 5/4) very fine sandy loam (Bt); few faint reddish brown (5YR 5/3) clay films on faces of peds; surrounded by light reddish brown (5YR 6/3) very fine sandy loam (E); common medium distinct yellowish red (5YR 5/6) mottles; moderate medium and thick platy structure; friable; slightly acid; diffuse wavy boundary.

C—41 to 60 inches; light reddish brown (5YR 6/3) and reddish brown (5YR 5/4), stratified very fine sandy loam, loamy very fine sand, and fine sand; many medium prominent strong brown (7.5YR 5/6) mottles in the upper part; moderate medium and thick platy structure; friable; slightly acid.

The thickness of the solum is 26 to 42 inches. Some pedons have an A horizon. This horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 or 2. The E horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 1 or 2. The A and E horizons are loamy very fine sand, very fine sandy loam, or silt loam.

The Bs horizon has value of 3 to 5 and chroma of 3 to 6. It is loamy very fine sand, very fine sandy loam, or silt loam. Some pedons have a Bhs horizon that has hue of 5YR or 7.5YR, value of 3, and chroma of 2 or 3.

The E′ horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 to 6, and chroma of 2 or 3. The Bt part of the B/E horizon has hue of 5YR, 7.5YR, or 10YR and value and chroma of 4 to 6. The E part has colors similar to those of the E′ horizon. The E′ and B/E horizons are loamy very fine sand, very fine sandy loam, or silt loam.

The C horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 to 6, and chroma of 3 to 6. It is stratified loamy very fine sand, very fine sandy loam, silt loam, very fine sand, or fine sand.

Gay Series

The Gay series consists of very deep, poorly drained soils on ground moraines and end moraines. These soils formed in loamy material. Permeability is moderate. Slopes range from 0 to 2 percent.

Gay soils are commonly adjacent to Oldman, Rudyard, and Westbury soils. Oldman soils are moderately well drained and are in the higher landscape positions. They formed in loamy deposits. Rudyard and Westbury soils are somewhat poorly drained and are in the slightly higher landscape positions. Rudyard soils are clayey. Westbury soils formed in loamy deposits.

Typical pedon of Gay stony muck, 2,480 feet west and 300 feet south of the northeast corner of sec. 15, T. 45 N., R. 2 E.

Oa—0 to 5 inches; dark brown (7.5YR 3/2) stony muck; weak fine subangular blocky structure; friable; many fine and medium roots; about 5 percent cobbles and 20 percent stones; strongly acid; clear wavy boundary.

Eg—5 to 10 inches; light brownish gray (10YR 6/2) stony sandy loam; many coarse faint brown (10YR 5/3) mottles; weak medium subangular blocky structure; friable; many fine and medium roots; about 10 percent gravel, 2 percent cobbles, and 20 percent stones; strongly acid; clear wavy boundary.

Bw—10 to 16 inches; brown (10YR 5/3) sandy loam; few medium faint dark yellowish brown (10YR 4/3) mottles; weak medium subangular blocky structure; friable; few medium roots; about 10 percent gravel and 2 percent cobbles; strongly acid; gradual wavy boundary.

BC—16 to 24 inches; pale brown (10YR 6/3) sandy loam; few fine faint light brownish gray (10YR 6/2) and common medium distinct dark yellowish brown (10YR 4/4) mottles; weak medium subangular blocky structure; friable; about 10 percent gravel and 2 percent cobbles; strongly acid; clear wavy boundary.

C—24 to 60 inches; light brown (7.5YR 6/4) sandy loam; common medium distinct dark yellowish brown (10YR 4/4) mottles; massive; friable; about 10 percent gravel and 2 percent cobbles; strongly acid.

The thickness of the solum ranges from 15 to 30 inches. The content of stones in the surface layer and subsurface layer is 15 to 30 percent. Throughout the profile, the content of gravel is 0 to 10 percent and the content of cobbles is 0 to 2 percent.

The Oa horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2, or it is neutral in hue and has value of 2 or 3. Some pedons have an A horizon that has hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 1 or 2. The Eg horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 1 or 2. It is stony sandy loam or stony loamy sand. The Bw horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 3 or 4. The C horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 3 or 4.

Gogomain Series

The Gogomain series consists of very deep, poorly drained soils on lake plains. These soils formed in loamy lacustrine sediments underlain by clayey deposits. Permeability is moderately rapid in the upper part of the profile and very slow in the lower part. Slopes are less than 2 percent.

Gogomain soils are commonly adjacent to Biscuit, Sugar, and Pickford soils. Biscuit soils are somewhat poorly drained and are in the slightly higher landscape positions. Sugar soils are moderately well drained and are on knolls, uplands, and side slopes. Pickford soils are clayey throughout. They are in landscape positions similar to those of the Gogomain soils.

Typical pedon of Gogomain very fine sandy loam, 1,100 feet north and 135 feet west of the southeast corner of sec. 1, T. 44 N., R. 3 W.

A—0 to 6 inches; black (10YR 2/1) very fine sandy loam, dark gray (10YR 4/1) dry; moderate medium granular structure; very friable; many fine to coarse roots; common fine pores; medium acid; abrupt smooth boundary.

Bg—6 to 10 inches; grayish brown (10YR 5/2) very fine sandy loam; few medium distinct yellowish brown (10YR 5/6) mottles; weak medium platy structure parting to weak fine subangular blocky; very friable; common fine and medium roots; common fine pores; neutral; abrupt smooth boundary.

Bw1—10 to 19 inches; pale brown (10YR 6/3) loamy very fine sand; few medium distinct dark gray (10YR 4/1) and common medium distinct yellowish brown (10YR 5/6) mottles; weak medium platy structure parting to weak fine subangular blocky; very friable; common fine roots; mildly alkaline; clear wavy boundary.

Bw2—19 to 29 inches; brown (10YR 5/3) very fine sand; few medium distinct dark gray (10YR 4/1) and common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium and coarse platy structure parting to weak fine subangular blocky; very friable; few very fine and fine roots; moderately alkaline; clear wavy boundary.

B′g—29 to 37 inches; brown (7.5YR 5/2) very fine sand; moderate medium subangular blocky structure; very friable; few very fine roots; moderately alkaline; abrupt smooth boundary.

2C—37 to 39 inches; light reddish brown (5YR 6/3) clay; common coarse distinct yellowish red (5YR 5/6) and gray (5YR 5/1) mottles; weak medium and thick platy structure parting to weak fine subangular blocky; firm; few very fine roots; slight effervescence; moderately alkaline; abrupt smooth boundary.

2Cg—39 to 60 inches; pinkish gray (5YR 6/2) clay; few coarse distinct yellowish red (5YR 5/6) and few coarse faint gray (5YR 5/1) mottles; weak medium and thick platy structure parting to weak fine subangular blocky; firm; few very fine roots; strong effervescence; moderately alkaline.

Depth to the 2C horizon ranges from 20 to 40 inches. The A horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 or 2. Some pedons have an Ap horizon that has colors similar to those of the A horizon. This horizon is as much as 9 inches thick.

The Bg and B′g horizons have hue of 7.5YR, 2.5Y, or 10YR, value of 4 to 6, and chroma of 1 or 2. They are very fine sandy loam, loamy very fine sand, very fine sand, or silt loam.

The Bw horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 to 4. It is very fine sandy loam, loamy very fine sand, very fine sand, or silt loam. The 2C horizon has hue of 7.5YR, 5YR, or 2.5YR, value of 4 to 6, and chroma of 2 to 4. It is clay or silty clay.

Grousehaven Series

The Grousehaven series consists of very deep, very poorly drained soils that formed in organic material 7 to 15 inches deep over stratified deposits of marl. These soils formed in lakes, drainageways, and depressions on ground moraines. Permeability is moderately slow to moderately rapid in the surface layer and slow or very slow in the underlying stratified marl. Slopes range from 0 to 2 percent.

Grousehaven soils are commonly adjacent to Shelter, Summerville, Ensign, and Chippeny soils. Summerville, Ensign, and Chippeny soils are underlain by limestone bedrock. Shelter and Ensign soils are somewhat poorly drained and are in the slightly higher landscape positions. Summerville soils are well drained and are on level uplands. Chippeny soils are very poorly drained and are in landscape positions similar to those of the Grousehaven soils.

Typical pedon of Grousehaven muck, 1,000 feet east and 300 feet north of the southwest corner of sec. 33, T. 42 N., R. 6 E.

Oa—0 to 15 inches; sapric material, black (10YR 2/1) broken face, rubbed, and pressed; about 35 percent fiber, less than 5 percent rubbed; weak fine granular structure; slightly sticky; many fine to coarse roots; neutral; abrupt smooth boundary.

Cg1—15 to 40 inches; gray (10YR 5/1) and grayish brown (10YR 5/2) marl that has thin layers of loamy very fine sand; common fine distinct dark yellowish brown (10YR 4/6) mottles; massive; nonsticky; common fine and medium roots; many snail shells; strong effervescence; moderately alkaline; diffuse wavy boundary.

Cg2—40 to 60 inches; grayish brown (10YR 5/2) and light brownish gray (10YR 6/2) marl that has thin layers of silt and very fine sandy loam; massive; nonsticky; mildly alkaline; abrupt smooth boundary.

Depth to the stratified material ranges from 4 to 16 inches. In some pedons the surface has 1 or 2 inches of live fiber.

The Oa horizon has hue of 10YR or 7.5YR and chroma of 1 or 2 or is neutral in hue. The Cg horizon has hue of 5Y or 10YR, value of 5 to 8, and chroma of 1 or 2. The marl has thin layers that range from loamy very fine sand to silt.

Guardlake Series

The Guardlake series consists of very deep, well drained soils on outwash plains and ground moraines. These soils formed in loamy deposits overlying sand and gravel. Permeability is moderate in the loamy part of the profile and very rapid in the substratum. Slopes range from 0 to 15 percent.

The Guardlake soils in this county are taxadjuncts to the series because they do not have a Bhs horizon. This difference, however, does not affect the use and management of the soils.

Guardlake soils are commonly adjacent to Au Gres and Kalkaska soils. These adjacent soils formed in sandy deposits. Au Gres soils are somewhat poorly drained and are in the lower landscape positions.

Kalkaska soils are in landscape positions similar to those of the Guardlake soils.

Typical pedon of Guardlake loam, 0 to 6 percent slopes, 2,250 feet south and 200 feet west of the northeast corner of sec. 2, T. 42 N., R. 2 W.

A—0 to 5 inches; black (10YR 2/1) loam, dark gray (10YR 4/1) dry; moderate medium granular structure; friable; many fine and medium and few coarse roots; about 5 percent gravel and 1 percent cobbles; medium acid; clear wavy boundary.

Bs1—5 to 11 inches; dark reddish brown (5YR 3/4) very cobbly sandy loam; weak medium subangular blocky structure; friable; many fine to coarse roots; about 20 percent gravel and 15 percent cobbles; medium acid; clear wavy boundary.

Bs2—11 to 16 inches; reddish brown (5YR 4/4) very cobbly sandy loam; weak medium subangular blocky structure; friable; many fine to coarse roots; about 20 percent gravel and 20 percent cobbles; slightly acid; clear wavy boundary.

2C1—16 to 24 inches; brown (7.5YR 5/4) very gravelly sand; single grain; loose; few fine and medium roots; about 35 percent gravel and 15 percent cobbles; mildly alkaline; clear wavy boundary.

2C2—24 to 60 inches; pale brown (10YR 6/3) very gravelly coarse sand; single grain; loose; few fine roots; about 50 percent gravel and 5 percent cobbles; slight effervescence; moderately alkaline.

The thickness of the solum ranges from 10 to 24 inches. The content of gravel ranges from 0 to 25 percent in the solum and from 15 to 50 percent in the substratum. The content of rock fragments larger than 3 inches in diameter ranges from 0 to 25 percent in the solum and from 0 to 30 percent in the substratum.

The A horizon has value of 2 or 3 and chroma of 1 or 2, or it is neutral in hue and has value of 2 or 3. Some pedons have a thin E horizon that has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 1 or 2. The Bs horizon has hue of 5YR or 7.5YR. It is the gravelly or cobbly and very gravelly or very cobbly analogs of sandy loam or fine sandy loam. The 2C horizon has value of 5 to 7 and chroma of 3 to 6. It is the very gravelly or very cobbly analogs of sand and coarse sand.

Gutport Series

The Gutport series consists of moderately deep, very poorly drained soils on lake plains. These soils formed in organic deposits 9 to 15 inches deep over silty and clayey deposits. They are underlain by limestone bedrock. Permeability is moderately slow to moderately rapid in the organic material and slow in the clayey material. Slopes are less than 2 percent.

Gutport soils are commonly adjacent to Chippeny, Ensign, and Ruse soils. Chippeny soils formed in organic material 16 to 51 inches deep over bedrock. They are in landscape positions similar to those of the Gutport soils. Ensign and Ruse soils formed in loamy material 10 to 20 inches deep over bedrock. Ensign soils are somewhat poorly drained and are in the higher landscape positions. Ruse soils are poorly drained and are in landscape positions similar to those of the Gutport soils.

Typical pedon of Gutport muck, 2,100 feet west and 200 feet south of the northeast corner of sec. 32, T. 43 N., R. 6 E.

Oi—0 to 1 inch; fibric material, dark reddish brown (5YR 3/3) broken face, dark reddish brown (5YR 3/2) rubbed; about 95 percent fiber, 90 percent rubbed; massive; primarily sphagnum moss fibers; slightly acid; abrupt smooth boundary.

Oa—1 to 13 inches; sapric material, black (N 2/0) broken face and rubbed; about 10 percent fiber, 5 percent rubbed; weak medium granular structure; friable; many fine to coarse roots; neutral; abrupt smooth boundary.

Bg—13 to 16 inches; dark gray (5Y 4/1) silt loam; weak medium granular structure; friable; many fine to coarse roots; neutral; abrupt smooth boundary.

Cg—16 to 17 inches; gray (5Y 5/1) silty clay loam; massive; friable; many fine to coarse roots; mildly alkaline; abrupt smooth boundary.

C—17 to 27 inches; varved, reddish brown (5YR 5/4) and pinkish gray (5YR 6/2) silty clay; many medium and coarse prominent strong brown (7.5YR 4/6), distinct brown (7.5YR 5/4), and prominent greenish gray (5GY 6/1) mottles; massive; firm; few fine to coarse roots; slight effervescence; mildly alkaline; abrupt smooth boundary.

2R—27 inches; limestone bedrock.

The depth to limestone bedrock is dominantly 20 to 30 inches but ranges to 40 inches. The organic layers are 9 to 15 inches thick.

The Oi horizon has hue of 5YR to 10YR, value of 3 to 5, and chroma of 3. The Oa horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1, or it is neutral in hue and has value of 2 or 3. The Bg and Cg horizons have hue of 5Y, 2.5Y, or 10YR, value of 4 or 5, and chroma of 1 or 2. They are silt loam, silty clay loam, or clay. The C horizon has hue of 7.5YR or 5YR, value of 4 to 6, and chroma of 2 to 6. It is silty clay or clay.

Halfaday Series

The Halfaday series consists of very deep, moderately well drained soils that formed in sandy deposits on outwash plains, stream terraces, lake plains, and ground moraines. Permeability is rapid. Slopes range from 0 to 3 percent.

Halfaday soils are commonly adjacent to Kalkaska, Au Gres, and Kinross soils. Kalkaska soils are somewhat excessively drained and are in the slightly higher landscape positions. Au Gres soils are somewhat poorly drained and are in the slightly lower landscape positions. Kinross soils are poorly drained and are in depressions and drainageways.

Typical pedon of Halfaday sand, 0 to 3 percent slopes, 990 feet east and 825 feet north of the southwest corner of sec. 16, T. 46 N., R. 5 W.

Oe—1 inch to 0; black (N 2/0), partially decomposed leaf litter.

A—0 to 1 inch; black (10YR 2/1) sand, dark gray (10YR 4/1) dry; weak fine granular structure; very friable; many fine roots; strongly acid; clear wavy boundary.

E—1 to 7 inches; brown (7.5YR 5/2) sand; single grain; loose; many fine and common medium roots; strongly acid; clear irregular boundary.

Bhs—7 to 13 inches; dark reddish brown (5YR 2/2) sand; weak medium subangular blocky structure; very friable; few fine roots; weakly cemented ortstein; strongly acid; abrupt irregular boundary.

Bs1—13 to 17 inches; dark brown (7.5YR 3/4) and strong brown (7.5YR 4/6) sand; weak coarse subangular blocky structure; very friable; common fine roots; weakly cemented ortstein; strongly acid; clear irregular boundary.

Bs2—17 to 30 inches; dark brown (7.5YR 7/4) and brownish yellow (10YR 6/6) sand; common fine distinct pink (7.5YR 7/4) mottles below a depth of 24 inches; weak medium subangular blocky structure; very friable; very few fine roots; few weakly cemented fragments of ortstein; strongly acid; gradual wavy boundary.

BC—30 to 37 inches; yellowish brown (10YR 5/6) sand; common fine and medium distinct light yellowish brown (10YR 6/4) mottles; single grain; loose; very few very fine roots; medium acid; gradual wavy boundary.

C—37 to 60 inches; brownish yellow (10YR 6/6) sand; few fine distinct pink (7.5YR 7/4) mottles; single grain; loose; medium acid.

The thickness of the solum ranges from 34 to 45 inches. The content of gravel ranges from 0 to 5 percent throughout the pedon. Lenses of fine and coarse sand are in some pedons. The depth to mottling ranges from 24 to 40 inches.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2, or it is neutral in hue and has value of 2 or 3. The E horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 2 or 3. The Bhs horizon has hue of 5YR or 7.5YR and value and chroma of 2 or 3. The Bs horizon has hue of 5YR, 7.5YR, or 10YR, value of 3 to 6, and chroma of 4 to 8. The C horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 3 to 6.

Ingalls Series

The Ingalls series consists of very deep, somewhat poorly drained soils on lake plains and outwash plains. These soils formed in sandy deposits over stratified lacustrine sediments. Permeability is rapid in the sandy part of the profile and moderately slow in the stratified part. Slopes range from 0 to 3 percent.

Ingalls soils are commonly adjacent to Au Gres, Manistee, and Rousseau soils. Au Gres soils are somewhat poorly drained and are in landscape positions similar to those of the Ingalls soils. They formed in sandy deposits. The moderately well drained Manistee and well drained Rousseau soils are in the higher landscape positions. Manistee soils formed in sandy deposits over clayey deposits. Rousseau soils formed in deposits of fine sand.

Typical pedon of Ingalls loamy sand, 0 to 3 percent slopes, 1,400 feet north and 650 feet west of the southeast corner of sec. 36, T. 48. N., R. 3 W.

Oi—3 to 2 inches; leaf litter and live roots.

Oa—2 inches to 0; black (N 2/0), well decomposed leaf litter; weak fine granular structure; very friable; many fine to coarse roots; strongly acid; abrupt wavy boundary.

E—0 to 7 inches; brown (10YR 5/3) loamy sand; weak medium granular structure; very friable; many fine and medium roots; strongly acid; abrupt irregular boundary.

Bs1—7 to 14 inches; dark brown (7.5YR 3/4) loamy sand; few fine distinct strong brown (7.5YR 5/6) mottles; strong medium subangular blocky structure; friable; few fine roots; few dark reddish brown (5YR 3/2) ortstein chunks; strongly acid; gradual broken boundary.

Bs2—14 to 20 inches; dark brown (7.5YR 4/4) sand; few fine distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; very friable; strongly acid; abrupt broken boundary.

BC—20 to 40 inches; brown (7.5YR 5/4) loamy fine sand; few fine distinct strong brown (7.5YR 5/6) mottles; massive; very friable; strongly acid; diffuse wavy boundary.

2C—40 to 60 inches; dark yellowish brown (10YR 4/4) and brown (10YR 5/3), stratified loamy fine sand and silt loam; few fine prominent strong brown (7.5YR 4/6) mottles; massive; very friable; neutral.

The solum ranges from 18 to 50 inches in thickness. The mineral horizons above the 2C horizon are sand, fine sand, loamy fine sand, or loamy sand.

Some pedons have an A horizon. This horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2, or it is neutral in hue and has value of 2 or 3. The E horizon has hue of 5YR, 7.5YR, or 10YR, value of 5 to 7, and chroma of 2 or 3.

Some pedons have a Bhs horizon. This horizon has hue of 5YR or 7.5YR and value and chroma of 2 or 3. The Bs horizon has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 4 to 6.

The 2C horizon has hue of 5YR, 7.5YR, or 10YR, value of 5 to 7, and chroma of 2 to 4. It is stratified very fine sand, loamy fine sand, loamy very fine sand, silt, or silt loam. Thin strata of silty clay, clay, silty clay loam, or fine sand are in some pedons.

Kalkaska Series

The Kalkaska series consists of very deep, somewhat excessively drained, rapidly permeable soils on outwash plains, ground moraines, and old beach ridges. These soils formed in sandy deposits. Slopes range from 0 to 60 percent.

The Kalkaska soils in this county have a thinner Bhs horizon than is defined as the range for the series. This difference, however, does not affect the use and management of the soils.

Kalkaska soils are commonly adjacent to Au Gres, Halfaday, Rousseau, and Rubicon soils. Au Gres soils are somewhat poorly drained and are lower on the landscape than the Kalkaska soils. Halfaday soils are moderately well drained. Rousseau soils formed in deposits of fine sand. Rousseau and Rubicon soils do not have dark colors in the upper part of the subsoil.

Typical pedon of Kalkaska sand, 0 to 6 percent slopes, 1,800 feet north and 600 feet east of the southwest corner of sec. 17, T. 45 N., R. 2 W.

Oe—1 inch to 0; partially decomposed hardwood leaf litter; clear smooth boundary.

A—0 to 2 inches; dark reddish brown (5YR 2/2) sand, dark gray (7.5YR 4/0) dry; weak fine granular structure; friable; many fine to coarse roots; about 2 percent gravel; strongly acid; clear wavy boundary.

E—2 to 7 inches; reddish brown (5YR 5/3) sand; weak medium subangular blocky structure; friable; many fine to coarse roots; about 2 percent gravel; strongly acid; clear wavy boundary.

Bhs—7 to 9 inches; dark reddish brown (5YR 3/2) loamy sand; moderate medium subangular blocky structure; friable; many fine to coarse roots; about 2 percent gravel; medium acid; clear irregular boundary.

Bs1—9 to 25 inches; dark brown (7.5YR 3/4) sand; weak medium subangular blocky structure; very friable; many fine to coarse roots; few fragments of weakly cemented ortstein; about 2 percent gravel; medium acid; gradual wavy boundary.

Bs2—25 to 31 inches; strong brown (7.5YR 5/6) sand; single grain; loose; few fine roots; about 2 percent gravel; medium acid; gradual wavy boundary.

C—31 to 60 inches; yellowish brown (10YR 5/6) sand; single grain; loose; few fine roots; about 2 percent gravel; slightly acid.

The solum is 24 to 50 inches thick. The content of gravel ranges from 0 to 5 percent throughout the profile.

The A horizon has hue of 5YR, 7.5YR, or 10YR, value of 2 or 3, and chroma of 1 or 2. Some pedons have an Ap horizon that has colors similar to those of the A horizon. The E horizon has hue of 5YR, 7.5YR, or 10YR, value of 5 or 6, and chroma of 2 or 3. It is loamy sand or sand. The Bhs horizon has hue of 5YR or 7.5YR and value and chroma of 2 or 3. The Bs horizon has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 4 to 6. The C horizon has hue of 7.5YR or 10YR.

Kinross Series

The Kinross series consists of very deep, poorly drained, rapidly permeable soils on outwash plains and ground moraines. These soils formed in sandy deposits. Slopes range from 0 to 2 percent.

Kinross soils are commonly adjacent to Au Gres, Markey, and Wainola soils. Au Gres and Wainola soils are somewhat poorly drained and are in the higher landscape positions. Wainola soils formed in deposits of fine sand. Markey soils formed in organic material 16 to 50 inches deep over sandy deposits. They are in landscape positions similar to or slightly lower than those of the Kinross soils.

Typical pedon of Kinross muck, in an area of Kinross-Au Gres complex, 0 to 3 percent slopes; 2,000 feet south and 300 feet west of the northeast corner of sec. 35, T. 45 N., R. 2 W.

Oa—0 to 5 inches; sapric material, black (N 2/0) broken face and rubbed; about 10 percent fiber, less than 5 percent rubbed; weak medium granular structure; very friable; many fine to coarse roots; extremely acid; abrupt smooth boundary.

E—5 to 10 inches; brown (10YR 5/3) sand; single grain; loose; common fine and medium roots; very strongly acid; clear smooth boundary.

Bhs—10 to 13 inches; dark brown (10YR 3/3) sand; few fine distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; very friable; very strongly acid; clear irregular boundary.

Bs—13 to 42 inches; brown (7.5YR 4/4) sand; few fine distinct strong brown (7.5YR 5/6) mottles; single grain; loose; strongly acid; gradual wavy boundary.

C—42 to 60 inches; grayish brown (10YR 5/2) sand; single grain; loose; strongly acid.

The solum is 25 to 50 inches thick. The mineral part of the solum is sand or fine sand.

The O horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2, or it is neutral in hue and has value of 2 or 3. The E horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 or 3. The Bhs horizon has hue of 5YR, 7.5YR, or 10YR and value and chroma of 2 or 3. The Bs horizon has hue of 7.5YR or 10YR, value of 3 to 6, and chroma of 4 to 6. The C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 to 4. It is sand or fine sand.

Longrie Series

The Longrie series consists of moderately deep, well drained soils on ground moraines, lake benches, and terraces. These soils formed in loamy material 20 to 40 inches deep over limestone bedrock. Permeability is moderate. Slopes range from 0 to 6 percent.

Longrie soils are commonly adjacent to Ensign, Posen, and Summerville soils. Ensign soils are somewhat poorly drained and are in the lower landscape positions. Posen and Summerville soils are in landscape positions similar to those of the Longrie soils. Posen soils do not have bedrock within a depth of 40 inches. Summerville soils have bedrock at a depth of 10 to 20 inches.

Typical pedon of Longrie sandy loam, 1 to 6 percent slopes, 2,300 feet east and 2,500 feet south of the northwest corner of sec. 17, T. 44 N., R. 6 W.

A—0 to 4 inches; black (5YR 2/1) sandy loam, dark gray (N 4/0) dry; moderate medium granular structure; friable; many fine to coarse roots; medium acid; clear smooth boundary.

E—4 to 9 inches; reddish gray (5YR 5/2) sandy loam; moderate medium subangular blocky structure; friable; many fine to coarse roots; slightly acid; clear wavy boundary.

Bhs—9 to 11 inches; dark reddish brown (5YR 3/3) fine sandy loam; moderate medium subangular blocky structure; friable; many fine to coarse roots; slightly acid; clear irregular boundary.

Bs—11 to 27 inches; reddish brown (5YR 4/4) fine sandy loam; moderate medium subangular blocky structure; friable; many fine and medium roots; slightly acid; clear wavy boundary.

2C—27 to 31 inches; light brown (7.5YR 6/4) gravelly loam; massive; friable; common fine and medium roots; about 15 percent gravel and 5 percent cobbles; strong effervescence; moderately alkaline; abrupt smooth boundary.

3R—31 inches; limestone bedrock.

The thickness of the solum ranges from 20 to 32 inches. The depth to bedrock ranges from 20 to 40 inches. The content of gravel ranges from 0 to 15 percent throughout the profile. The content of cobbles also ranges from 0 to 15 percent.

The A horizon has hue of 5YR, 7.5YR, or 10YR, value of 2 or 3, and chroma of 1 or 2, or it is neutral in hue and has value of 2 or 3. The E horizon has hue of 5YR, 7.5YR, or 10YR, value of 5 or 6, and chroma of 1 or 2.

The Bhs horizon has hue of 5YR or 7.5YR and value and chroma of 2 or 3. The Bs horizon has hue of 5YR, 7.5YR, or 10YR, value of 3 to 5, and chroma of 3 to 6. The Bhs and Bs horizons are sandy loam, fine sandy loam, silt loam, loam, or the gravelly or cobbly analogs of those textures.

The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 or 4. It is sandy loam, fine sandy loam, loam, or the gravelly analogs of those textures. Some pedons do not have a C horizon.

Loxley Series

The Loxley series consists of very deep, very poorly drained soils that formed in organic material more than 51 inches thick. These soils are in closed depressions on outwash plains and lake plains. Permeability is moderately slow to moderately rapid. Slopes range from 0 to 2 percent.

Loxley soils are commonly adjacent to Au Gres, Dawson, and Deer Park soils. Au Gres soils are sandy. They are somewhat poorly drained and are in the slightly higher landscape positions. Dawson soils formed in 16 to 50 inches of organic material. They are in landscape positions similar to those of the Loxley soils. Deer Park soils are excessively drained and are on ridges, knolls, and uplands. They are sandy.

Typical pedon of Loxley mucky peat, in an area of Dawson and Loxley peats; 1,000 feet south and 800 feet west of the northeast corner of sec. 13, T. 45 N., R. 1 W.

Oi1—0 to 5 inches; fibric material, dark yellowish brown (10YR 4/4) broken face, very pale brown (10YR 7/4) rubbed, and light yellowish brown (10YR 6/4) pressed; 100 percent fiber undisturbed and rubbed; massive; very friable; primarily sphagnum moss and live roots; many fine and medium roots; extremely acid; clear smooth boundary.

Oi2—5 to 10 inches; fibric material, black (10YR 2/1) broken face and rubbed and very dark brown (10YR 2/2) pressed; about 85 percent fiber, less than 75 percent rubbed; massive; very friable; primarily sphagnum moss and live roots; many fine to coarse roots; extremely acid; clear wavy boundary.

Oa1—10 to 27 inches; sapric material, black (5YR 2/1) broken face, dark reddish brown (5YR 2/2) rubbed and pressed; about 10 percent fiber, 5 percent rubbed; weak medium subangular blocky structure; friable; primarily herbaceous fibers with few woody fragments; few medium roots; extremely acid; clear smooth boundary.

Oa2—27 to 60 inches; sapric material, black (10YR 2/1) broken face, very dark brown (10YR 2/2) rubbed and pressed; about 40 percent fiber, 5 percent rubbed; massive; friable; extremely acid.

The organic layers are more than 51 inches thick. The sphagnum moss at the surface is as much as 18 inches thick. In some pedons the surface tier consists of hemic or sapric material, or both. The surface layers are derived from herbaceous material and sphagnum moss. Layers within the control section have hue of 5YR, 7.5YR, or 10YR, value of 2 to 5, and chroma of 1 to 4. The color commonly becomes darker when the soil is briefly exposed to air.

Manistee Series

The Manistee series consists of very deep, well drained and moderately well drained soils on lake plains, outwash plains, and ground moraines. These soils formed in sandy deposits over clayey material. Permeability is rapid in the sandy layers and slow and very slow in the clayey material. Slopes range from 0 to 50 percent.

Manistee soils are commonly adjacent to Allendale, Kalkaska, and Ontonagon soils. Allendale soils are somewhat poorly drained and are in depressions and drainageways. Kalkaska and Ontonagon soils are in landscape positions similar to those of the Manistee soils. Kalkaska soils are sandy. Ontonagon soils formed in clayey deposits.

Typical pedon of Manistee sand, 0 to 6 percent slopes, 2,000 feet west and 1,400 feet south of the northeast corner of sec. 26, T. 47 N., R. 6 W.

Oa—3 inches to 0; black (5YR 2/1), well decomposed leaf litter; weak medium granular structure; very friable; many fine to very coarse roots; very strongly acid; abrupt smooth boundary.

E—0 to 9 inches; pinkish gray (7.5YR 6/2) sand; moderate medium subangular blocky structure; very friable; common medium to very coarse roots; about 2 percent gravel; strongly acid; clear smooth boundary.

Bhs—9 to 16 inches; dark reddish brown (5YR 2/2) sand; moderate coarse and medium subangular blocky structure; firm; common medium and coarse roots; strongly cemented ortstein in 80 percent of the horizon; about 2 percent gravel; medium acid; clear wavy boundary.

Bs—16 to 21 inches; dark brown (7.5YR 3/4) sand; common medium distinct strong brown (7.5YR 4/6) mottles in the lower part of the horizon; moderate coarse and medium subangular blocky structure; firm; common fine and medium roots; moderately cemented ortstein in 60 percent of the horizon; about 2 percent gravel; slightly acid; clear smooth boundary.

2B/E—21 to 35 inches; about 70 percent reddish brown (5YR 4/4) silty clay loam (Bt); many faint reddish brown (5YR 5/4) clay skins on horizontal and vertical faces of peds; surrounded by pinkish gray (7.5YR 7/2) loamy sand (E); many coarse distinct strong brown (7.5YR 5/6) mottles; strong coarse and medium subangular blocky structure; firm; few fine roots; common fine vesicular pores; about 2 percent gravel; neutral; gradual wavy boundary.

2C—35 to 60 inches; reddish brown (5YR 5/4) clay that has thin, light gray (5Y 7/1) bands of silt; massive; firm; slight effervescence; mildly alkaline.

The thickness of the solum ranges from 30 to 45 inches. The thickness of the upper sandy layers ranges from 20 to 35 inches. The content of gravel is as much as 5 percent in the sandy layers.

Some pedons have an Ap or A horizon. The Ap horizon has hue of 10YR or 7.5YR, value of 3 or 4, and chroma of 1 to 3. The A horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 or 2. The E horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 or 3. The Ap, A, and E horizons are sand, loamy sand, or fine sand.

The Bhs horizon has hue of 5YR or 7.5YR and value and chroma of 2 or 3. The Bs horizon has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 4 to 6. The Bhs and Bs horizons are sand, loamy sand, or fine sand.

The Bt part of the 2B/E horizon has hue of 2.5YR or 5YR and value and chroma of 4 or 5. It is silty clay loam, silty clay, or clay. The E part has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 2 or 3. It is sand, loamy sand, or fine sand. Some pedons have a 2Bt, E′, or 2E/B horizon.

The 2C horizon has hue of 5YR or 2.5YR, value of 4 to 6, and chroma of 3 or 4. It is clay or silty clay that has thin bands of silt. Some pedons do not have bands of silt or silt loam.

Markey Series

The Markey series consists of very deep, very poorly drained soils that formed in organic material 16 to 50 inches deep over sandy deposits. These soils are in depressions and drainageways on lake plains, outwash plains, and ground moraines. Permeability is moderately slow to moderately rapid in the organic material and rapid in the underlying sandy material. Slopes range from 0 to 2 percent.

Markey soils are commonly adjacent to Au Gres, Carbondale, Kinross, and Rousseau soils. Au Gres soils are somewhat poorly drained and are in the slightly higher landscape positions. They are sandy. Carbondale soils are muck to a depth of more than 51 inches. They are in landscape positions similar to those of the Markey soils. Kinross and Rousseau soils are sandy. Kinross soils are poorly drained and are on low knolls and ridges. Rousseau soils are well drained and are on knolls and ridges.

Typical pedon of Markey mucky peat, in an area of Markey and Carbondale mucks; 396 feet south and 528 feet east of the northwest corner of sec. 17, T. 45 N., R. 1 W.

Oe—0 to 3 inches; hemic material, dark reddish brown (5YR 3/2) broken face, very dark gray (5YR 3/1) rubbed, and black (5YR 2/1) pressed; about 90 percent fiber, 25 percent rubbed; massive; friable; primarily herbaceous fibers; many fine to coarse roots; medium acid; abrupt smooth boundary.

Oa1—3 to 6 inches; sapric material, black (N 2/0) broken face, rubbed, and pressed; about 40 percent fiber, 10 percent rubbed; massive; friable; many fine to coarse roots; primarily herbaceous fibers; medium acid; abrupt smooth boundary.

Oa2—6 to 15 inches; sapric material, dark brown (7.5YR 3/2) broken face, dark reddish brown (5YR 2/2) rubbed and pressed; about 40 percent fiber, 5 percent rubbed; massive; friable; few fine roots; primarily herbaceous fibers; medium acid; abrupt smooth boundary.

Oa3—15 to 33 inches; sapric material, dark reddish brown (5YR 3/3) broken face, dark reddish brown (5YR 3/2) rubbed and pressed; about 80 percent fiber, 10 percent rubbed; massive; friable; primarily herbaceous fibers; medium acid; abrupt smooth boundary.

C—33 to 60 inches; brown (7.5YR 4/4) sand; single grain; loose; medium acid.

Depth to the C horizon is commonly 24 to 42 inches but ranges from 16 to 50 inches. The organic material is primarily herbaceous but has occasional woody fragments (as much as 15 percent). Some pedons have a 1- to 4-inch layer of sphagnum moss at the surface. The organic material has hue of 10YR, 7.5YR, 2.5YR, or 5YR, value of 2 or 3, and chroma of 1 to 3, or it is neutral in hue and has value of 2 or 3. The subsurface tier is dominantly sapric material, but some pedons have as much as 10 inches of hemic material. The C horizon has hue of 7.5YR, 10YR, or 2.5Y, value of 5 or 6, and chroma of 2 to 4. It is sand or loamy sand, but in some pedons it has thin layers of loamy material over the sand or has some gravel.

Menominee Series

The Menominee series consists of very deep, moderately well drained soils that formed in sandy deposits over loamy glacial till. These soils are on ground moraines. Permeability is rapid in the upper sandy part of the profile and moderately slow in the loamy till. Slopes range from 0 to 6 percent.

Menominee soils are commonly adjacent to Emmet and Kalkaska soils. The adjacent soils are in landscape positions similar to those of the Menominee soils. Emmet soils formed in loamy deposits. Kalkaska soils are sandy throughout.

Typical pedon of Menominee loamy sand, 0 to 6 percent slopes, 1,400 feet east and 2,600 feet south of the northwest corner of sec. 30, T. 44 N., R. 6 W.

Ap—0 to 5 inches; very dark gray (10YR 3/1) loamy sand, grayish brown (10YR 5/2) dry; weak fine granular structure parting to single grain; friable; many very fine, fine, and medium roots; medium acid; abrupt wavy boundary.

E—5 to 11 inches; grayish brown (10YR 5/2) loamy sand; weak fine subangular blocky structure parting to single grain; friable; common very fine and fine roots; medium acid; abrupt wavy boundary.

Bhs—11 to 13 inches; dark reddish brown (5YR 2/2) loamy sand; weak fine subangular blocky structure parting to single grain; friable; few fine roots; medium acid; abrupt wavy boundary.

Bs—13 to 28 inches; strong brown (7.5YR 3/4) sand; weak fine subangular blocky structure parting to single grain; friable; few fine roots; about 30 percent strongly cemented ortstein; medium acid; abrupt wavy boundary.

2B/E—28 to 34 inches; about 75 percent reddish brown (5YR 4/4) clay loam (B); common faint reddish brown (5YR 4/4) clay films on faces of peds; surrounded by reddish brown (5YR 5/3) sandy loam (E); few fine distinct yellowish red (5YR 5/6) and few medium prominent strong brown (7.5YR 5/6) mottles; moderate medium and coarse subangular blocky structure; friable; slightly acid; gradual wavy boundary.

2C—34 to 60 inches; reddish brown (5YR 5/4) sandy loam; few fine distinct strong brown (5YR 5/6) mottles; about 3 percent gravel; massive; friable; neutral.

Depth to the loamy till ranges from 20 to 40 inches. The upper sandy part of the profile is fine sand, sand, or loamy sand. The content of rock fragments ranges from 3 to 15 percent in the loamy material.

The Ap horizon has value of 2 or 3 and chroma of 1 or 2. The E horizon has hue of 10YR or 7.5YR, value of 5 to 7, and chroma of 2 or 3. The Bhs horizon has hue of 7.5YR or 5YR, value of 3, and chroma of 2 or 3. The Bs horizon has hue of 7.5YR or 5YR, value of 3 to 5, and chroma of 4 to 6. The Bt part of the 2B/E horizon has hue of 10YR, 7.5YR, or 5YR, value of 4 or 5, and chroma of 3 to 6. It is clay loam, sandy clay loam, loam, silt loam, or silty clay loam. Some pedons have a 2Bt, E′, or 2E/B horizon that has colors similar to those of the 2B/E horizon. The 2C horizon has hue of 10YR, 7.5YR, or 5YR, value of 4 to 6, and chroma of 3 to 6. It is sandy loam, clay loam, sandy clay loam, loam, silt loam, or silty clay loam.

Ocqueoc Series

The Ocqueoc series consists of very deep, moderately well drained soils on lake plains and outwash plains. These soils formed in sandy deposits over stratified lacustrine sediments. Permeability is rapid in the sandy part of the profile and moderately slow in the stratified material. Slopes range from 0 to 6 percent.

Ocqueoc soils are commonly adjacent to Ingalls, Kalkaska, and Rousseau soils. Ingalls soils are somewhat poorly drained and are in depressions and drainageways. Kalkaska and Rousseau soils formed in sandy deposits. They are in landscape positions similar to those of the Ocqueoc soils.

Typical pedon of Ocqueoc fine sand, 0 to 6 percent slopes, 200 feet north and 50 feet east of the southwest corner of sec. 9, T. 44 N., R. 1 W.

Oa—2 inches to 0; black (10YR 2/1), well decomposed leaf litter.

E—0 to 8 inches; pinkish gray (7.5YR 6/2) fine sand; weak medium subangular blocky structure; very friable; common fine roots; strongly acid; abrupt irregular boundary.

Bhs—8 to 9 inches; dark reddish brown (5YR 2/2) fine sand; weak fine subangular blocky structure; firm; common fine roots; strongly acid; abrupt irregular boundary.

Bs1—9 to 12 inches; dark brown (7.5YR 3/4) fine sand; weak fine subangular blocky structure; very friable; common fine roots; strongly acid; clear wavy boundary.

Bs2—12 to 16 inches; brown (7.5YR 4/4) fine sand; single grain; loose; few fine roots; strongly acid; clear wavy boundary.

BC—16 to 22 inches; dark yellowish brown (10YR 4/6) loamy fine sand; weak fine subangular blocky structure; very friable; few fine roots; medium acid; gradual wavy boundary.

2C—22 to 60 inches; brown (10YR 5/3 and 7.5YR 5/4) and yellowish brown (10YR 5/4), stratified fine sand, very fine sand, loamy very fine sand, silt, and very fine sandy loam; common fine and medium prominent strong brown (7.5YR 5/6 and 7.5YR 5/8) mottles; massive parting to weak coarse platy fragments; very friable; thin brittle layers of silt; few fine roots in the upper 20 inches; medium acid.

The thickness of the solum ranges from 15 to 30 inches. The solum is generally fine sand or sand, but the range includes loamy sand or loamy fine sand. Some pedons have an A horizon. This horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1, or it is neutral in hue and has value of 2 or 3. The E horizon has value of 5 or 6. The Bhs horizon has value and chroma of 2 or 3. It is discontinuous or occurs in pockets. The Bs horizon has value of 3 to 5 and chroma of 4 to 6. The 2C horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 to 6, and chroma of 3 or 4. It is stratified very fine sand, silt, fine sand, silty clay loam, loamy very fine sand, loamy fine sand, or very fine sandy loam.

Oldman Series

The Oldman series consists of very deep, moderately well drained soils on ground moraines and end moraines. These soils formed in loamy material. They have a fragipan. Permeability is moderate in the upper part of the profile, very slow in the fragipan, and moderately slow below the fragipan. Slopes range from 2 to 6 percent.

Oldman soils are commonly adjacent to Gay, Ontonagon, and Westbury soils. Gay and Westbury soils are in the lower landscape positions. Gay soils are poorly drained. Westbury soils are somewhat poorly drained. They formed in loamy deposits. Ontonagon soils formed in clayey deposits. They are in landscape positions similar to those of the Oldman soils.

Typical pedon of Oldman stony fine sandy loam, 2 to 6 percent slopes, 2,650 feet north and 2,375 feet west of the southeast corner of sec. 12, T. 47 N., R. 1 E.

Oa—1 inch to 0; black (10YR 2/1), well decomposed leaf litter; very friable; many fine and medium roots; about 5 percent gravel, 5 percent cobbles, and 15 percent stones; strongly acid; abrupt smooth boundary.

A—0 to 4 inches; black (5YR 2/1) stony fine sandy loam, dark gray (5YR 4/1) dry; moderate medium granular structure; friable; many fine to coarse roots; about 5 percent gravel, 5 percent cobbles, and 15 percent stones; strongly acid; clear wavy boundary.

E—4 to 5 inches; reddish gray (5YR 5/2) stony fine sandy loam; moderate medium subangular blocky structure; friable; many fine to coarse roots; about 5 percent gravel, 5 percent cobbles, and 5 percent stones; strongly acid; clear broken boundary.

Bhs1—5 to 8 inches; dark reddish brown (5YR 2/2) very cobbly fine sandy loam; moderate medium subangular blocky structure; friable; many fine to coarse roots; discontinuous weakly cemented ortstein; about 15 percent gravel, 15 percent cobbles, and 5 percent stones; strongly acid; clear wavy boundary.

Bhs2—8 to 13 inches; dark reddish brown (5YR 3/2) very cobbly fine sandy loam; moderate coarse and medium subangular blocky structure; friable; common fine and medium roots; about 15 percent gravel, 15 percent cobbles, and 5 percent stones; medium acid; clear wavy boundary.

Bs—13 to 19 inches; strong brown (7.5YR 4/6) very gravelly fine sandy loam; strong thick platy structure; firm; few fine and medium roots; common fine vesicular pores; thin discontinuous root mats along boundary with fragipan; about 25 percent gravel, 10 percent cobbles, and 5 percent stones; medium acid; abrupt wavy boundary.

Bx/Ex—19 to 26 inches; about 75 percent reddish brown (5YR 4/4) very gravelly sandy loam (B); few faint reddish brown (5YR 4/4) clay films on faces of peds; surrounded by light reddish brown (5YR 6/3) very gravelly sandy loam (E); many coarse prominent red (2.5YR 4/6) and many coarse distinct yellowish red (5YR 4/6) mottles; strong thick platy structure; firm and brittle when moist; many very fine vesicular pores; about 25 percent gravel, 10 percent cobbles, and 5 percent stones; slightly acid; clear wavy boundary.

Ex/Bx—26 to 46 inches; about 70 percent pinkish gray (5YR 6/2) very gravelly sandy loam (E); surrounding peds of reddish brown (2.5YR 5/4) very gravelly fine sandy loam (B); few fine distinct yellowish red (5YR 4/6) mottles; strong thick and medium platy structure; very firm and brittle when moist; few fine vesicular pores; about 25 percent gravel, 10 percent cobbles, and 5 percent stones; slightly acid; gradual wavy boundary.

E/B—46 to 60 inches; about 65 percent pinkish gray (5YR 6/2) very gravelly sandy loam (E); surrounding peds of reddish brown (5YR 5/4) very gravelly fine sandy loam (B); moderate medium subangular blocky structure; friable; about 25 percent gravel, 15 percent cobbles, and 5 percent stones; slightly acid.

The thickness of the solum ranges from 35 to more than 60 inches. Depth to the fragipan is 16 to 30 inches. The content of gravel ranges from 5 to 20 percent in the surface horizons and from 15 to 40 percent throughout the rest of the profile. The content of cobbles and stones ranges from 10 to 40 percent throughout the profile.

The A horizon has hue of 5YR or 7.5YR, value of 2 or 3, and chroma of 1 or 2. The E horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 2 or 3. The A and E horizons are the stony or very cobbly analogs of fine sandy loam or sandy loam.

The Bhs horizon has value and chroma of 2 or 3. The Bs horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4 to 6. The Bhs and Bs horizons are the very gravelly or very cobbly analogs of fine sandy loam, sandy loam, or silt loam.

The E part of the Ex/Bx horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 2 or 3. The B part has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4. Some pedons have an Ex or Bx horizon that has colors similar to those of the Ex/Bx horizon. The Ex/Bx horizon is the very gravelly or very cobbly analogs of sandy loam or fine sandy loam.

The E part of the E/B horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 2 or 3. The B part has hue of 2.5YR or 5YR and value of 4 or 5. The E/B horizon is the very gravelly or very cobbly analogs of fine sandy loam or sandy loam.

Some pedons have a C horizon. This horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 4 or 5. It is the very gravelly or very cobbly analogs of fine sandy loam or sandy loam.

Ontonagon Series

The Ontonagon series consists of very deep, well drained and moderately well drained, very slowly permeable soils on lake plains. These soils formed in clayey lacustrine deposits. Slopes range from 2 to 50 percent.

Ontonagon soils are commonly adjacent to Allendale, Pickford, and Rudyard soils. Allendale and Rudyard soils are somewhat poorly drained and are in the lower landscape positions. Allendale soils formed in sandy material 20 to 40 inches deep over clay. Pickford soils are poorly drained and are in the lower landscape positions.

Typical pedon of Ontonagon silt loam, 25 to 50 percent slopes, 2,500 feet north and 125 feet east of the southwest corner of sec. 15, T. 47 N., R. 1 E.

A—0 to 7 inches; dark brown (7.5YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; many fine roots; medium acid; clear smooth boundary.

B/E—7 to 13 inches; reddish brown (2.5YR 4/4) silty clay (Bt); tongues of brown (7.5YR 5/2) silt loam (E); moderate medium and coarse subangular blocky structure; friable; common fine roots; common faint reddish brown (2.5YR 4/4) clay films on faces of peds; neutral; gradual smooth boundary.

Bt—13 to 21 inches; reddish brown (2.5YR 4/4) clay; strong fine angular blocky structure; firm; common fine roots; common distinct reddish brown (2.5YR 4/4) clay flows on faces of peds; neutral; gradual smooth boundary.

BC—21 to 32 inches; reddish brown (2.5YR 4/4) and grayish brown (10YR 5/2) clay; moderate thick platy structure parting to strong very fine angular blocky; firm; few fine roots; mildly alkaline; gradual smooth boundary.

C—32 to 60 inches; reddish brown (2.5YR 4/4) clay; moderate thick platy structure parting to strong very fine angular blocky; grayish brown (10YR 5/2) varved layers; firm; common prominent light gray (10YR 7/1) coatings; strong effervescence; moderately alkaline.

The thickness of the solum and the depth to carbonates range from 16 to 32 inches. The A horizon has hue of 7.5YR or 10YR and value of 3 or 4. Some pedons have an Ap horizon. The B part of the B/E horizon has colors similar to those of the Bt horizon. The E part has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 or 3. The B/E horizon is silt loam, silty clay loam, or silty clay. The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 or 4. The C horizon has hue of 2.5YR, 5YR, 7.5YR, or 10YR, value of 4 or 5, and chroma of 2 to 4. It has thin varved layers that have hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 or 3.

Pence Series

The Pence series consists of very deep, well drained soils on outwash plains and terraces. These soils formed in sandy deposits. Permeability is moderately rapid or rapid in the solum and rapid in the substratum. Slopes range from 0 to 35 percent.

Pence soils are commonly adjacent to Au Gres, Kalkaska, and Sugar soils. Au Gres soils are sandy. They are somewhat poorly drained and are in the slightly lower landscape positions. Kalkaska and Sugar soils are in landscape positions similar to those of the Pence soils. Kalkaska soils formed in sandy deposits. Sugar soils formed in loamy deposits over clayey deposits.

Typical pedon of Pence loamy sand, 0 to 6 percent slopes, 1,500 feet west and 2,000 feet south of the northeast corner of sec. 5, T. 46 N., R. 5 W.

A—0 to 1 inch; black (N 2/0) loamy sand, dark gray (N 4/0) dry; weak fine granular structure; very friable; many fine to coarse roots; about 5 percent gravel and 5 percent cobbles; very strongly acid; abrupt smooth boundary.

E—1 to 4 inches; brown (7.5YR 5/2) loamy sand; weak medium subangular blocky structure; very friable; many fine and medium roots; about 5 percent gravel and 5 percent cobbles; very strongly acid; clear smooth boundary.

Bhs—4 to 6 inches; dark reddish brown (5YR 3/2) sandy loam; weak medium and fine subangular blocky structure; very friable; many fine to coarse roots; about 5 percent gravel and 2 percent cobbles; strongly acid; clear smooth boundary.

Bs—6 to 17 inches; dark brown (7.5YR 4/4) sandy loam; weak medium subangular blocky structure; very friable; common medium roots; about 10 percent gravel and 12 percent cobbles; strongly acid; clear wavy boundary.

2BC—17 to 28 inches; strong brown (7.5YR 4/6) sand and coarse sand; single grain; loose; common fine and medium roots; about 10 percent gravel; medium acid; clear wavy boundary.

2C—28 to 60 inches; strong brown (7.5YR 5/6) gravelly coarse sand; single grain; loose; about 15 percent gravel; slightly acid.

The thickness of the solum is 12 to 35 inches. The thickness of the loamy deposit is 10 to 20 inches. The content of gravel ranges from 0 to 15 percent in the A and E horizons and from 15 to 35 percent in the rest of the profile. The content of cobbles ranges from 0 to 5 percent in the solum and from 0 to 10 percent in the substratum.

The A horizon has hue of 5YR, 7.5YR, or 10YR, value of 2 or 3, and chroma of 1 or 2, or it is neutral in hue and has value of 2 or 3. The E horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 to 6, and chroma of 2. It is loamy sand, sandy loam, or fine sandy loam.

The Bhs horizon has hue of 5YR or 7.5YR and chroma of 2 or 3. It is 1 or 2 inches thick. The Bs horizon has hue of 5YR or 7.5YR, value of 3 or 4, and chroma of 4 to 6. The Bhs and Bs horizons are sandy loam, fine sandy loam, or the gravelly analogs of those textures.

The 2BC horizon has value of 4 or 5 and chroma of 4 to 6. It is sand, coarse sand, loamy sand, or the gravelly analogs of those textures. The 2C horizon has hue of 7.5YR or 10YR, value of 4 to 6, and chroma of 2 to 6. It is gravelly coarse sand or stratified sand, coarse sand, and gravel.

Pickford Series

The Pickford series consists of very deep, poorly drained soils that formed in clayey lacustrine deposits on lake plains and in depressional areas on moraines. Permeability is very slow. Slopes range from 0 to 2 percent.

Pickford soils are commonly adjacent to Fibre, Rudyard, and Soo soils. Fibre and Soo soils are in landscape positions similar to those of the Pickford soils. Fibre soils formed in sandy material 20 to 40 inches deep over clay. Soo soils have an argillic horizon. Rudyard soils are somewhat poorly drained and are in the slightly higher landscape positions.

Typical pedon of Pickford silty clay loam, 130 feet east and 570 feet south of the northwest corner of sec. 30, T. 46 N., R. 1 E.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 6/1) dry; moderate fine granular structure; friable; medium acid; abrupt smooth boundary.

Eg—8 to 10 inches; dark gray (10YR 4/1) silty clay loam; common fine prominent yellowish brown (10YR 5/8) mottles; moderate fine subangular blocky structure; firm; many fine and medium roots; neutral; clear smooth boundary.

Bg—10 to 16 inches; weak red (2.5YR 4/2) silty clay; many coarse prominent strong brown (7.5YR 5/8) and dark gray (10YR 4/1) mottles; moderate fine angular blocky structure; firm; few fine roots; neutral; gradual wavy boundary.

BCg—16 to 24 inches; weak red (2.5YR 4/2) clay; common fine prominent strong brown (7.5YR 5/8) and dark gray (10YR 4/1) mottles; weak very fine angular blocky structure; very firm; slight effervescence; mildly alkaline; clear smooth boundary.

C—24 to 60 inches; reddish brown (2.5YR 4/4) clay; common fine prominent yellowish red (5YR 5/8) mottles; massive; very firm; greenish gray (5GY 6/1) coatings of calcium carbonate on faces of peds; strong effervescence; moderately alkaline.

The depth to carbonates ranges from 14 to 30 inches. Some pedons have an O horizon as much as 6 inches thick. The Ap horizon has value of 2 or 3 and chroma of 1 or 2. It is silty clay loam or silt loam. Pedons in undisturbed areas have an A horizon that has colors and textures similar to those of the Ap horizon. The Eg horizon has hue of 10YR or 5Y, value of 4 or 5, and chroma of 1 or 2. It is silty clay loam, clay, or silty clay. The Bg horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 2 to 4. It is silty clay or clay. The C horizon has hue of 2.5YR or 5YR, value of 4 to 6, and chroma of 2 to 4. It is clay or silty clay.

Pinconning Series

The Pinconning series consists of very deep, poorly drained soils on lake plains and outwash plains at the margins of lake plains. These soils formed in sandy deposits over clayey material. Permeability is rapid in the sandy layers and slow or very slow in the clayey material. Slopes range from 0 to 2 percent.

The Pinconning soils in this county have a brighter colored substratum than is defined as the range for the series. This difference, however, does not affect the use and management of the soils.

Pinconning soils are commonly adjacent to Kinross, Markey, and Pickford soils. The adjacent soils are in landscape positions similar to those of the Pinconning soils. Kinross soils do not have a clayey subsoil. Markey soils formed in organic material 16 to 50 inches deep over sandy material. Pickford soils do not have sandy material in the upper part.

Typical pedon of Pinconning mucky loamy sand, 2,000 feet east and 200 feet south of the northwest corner of sec. 3, T. 43 N., R. 1 E.

Ap—0 to 8 inches; black (10YR 2/1) mucky loamy sand, very dark gray (10YR 3/1) dry; weak medium subangular blocky structure parting to moderate medium granular; friable; many very fine to medium roots; slightly acid; abrupt wavy boundary.

C—8 to 14 inches; yellowish brown (10YR 5/4) sand; many medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure parting to single grain; very friable; few very fine to medium roots; few discontinuous pockets of fine sand and loamy fine sand; neutral; clear wavy boundary.

Cg—14 to 21 inches; grayish brown (10YR 5/2) sand; few fine distinct yellowish brown (10YR 5/6) mottles; single grain; loose; mildly alkaline; abrupt smooth boundary.

2C1—21 to 32 inches; reddish gray (5YR 5/2) silty clay; few medium prominent strong brown (7.5YR 5/6) and common medium faint gray (5YR 5/1) mottles; massive; firm; slight effervescence; moderately alkaline; clear wavy boundary.

2C2—32 to 60 inches; reddish brown (5YR 4/3) clay; common medium distinct strong brown (7.5YR 5/6 and 5/8) and gray (10YR 6/1) mottles; massive; firm; strong effervescence; moderately alkaline.

Depth to the 2C horizon ranges from 20 to 30 inches. The Ap horizon has value of 2 or 3. Some pedons have an A horizon that has colors similar to those of the Ap horizon. The A horizon is mucky loamy sand, loamy sand, or sand. The C horizon has value of 5 or 6 and chroma of 3 or 4. The Cg horizon has value of 4 to 6 and chroma of 1 or 2. The C and Cg horizons are sand, loamy sand, or fine sand. The 2C horizon has hue of 5YR or 7.5YR, value of 4 to 6, and chroma of 2 or 3.

Posen Series

The Posen series consists of very deep, well drained, moderately permeable soils on ground moraines. These soils formed in loamy material. Slopes range from 1 to 35 percent.

Posen soils are commonly adjacent to Shelter and Longrie soils. Shelter soils are somewhat poorly drained and are in the slightly lower landscape positions. Longrie soils have bedrock at a depth of 20 to 40 inches. They are in landscape positions similar to those of the Posen soils.

Typical pedon of Posen stony fine sandy loam, 1 to 6 percent slopes, 2,400 feet east and 50 feet south of the northwest corner of sec. 8, T. 41 N., R. 7 E.

Oe—1 inch to 0; black (N 2/0), partially decomposed leaf litter; many very fine to medium roots.

A—0 to 3 inches; very dark gray (10YR 3/1) stony fine sandy loam, dark gray (10YR 4/1) dry; moderate medium granular structure; very friable; many very fine to medium and common coarse roots; about 3 percent gravel, 15 percent cobbles, and 15 percent stones; slightly acid; abrupt wavy boundary.

Bw1—3 to 10 inches; dark brown (10YR 3/3) stony silt loam; moderate fine and medium subangular blocky structure; friable; common very fine to medium roots; about 5 percent gravel, 10 percent cobbles, and 15 percent stones; neutral; abrupt wavy boundary.

Bw2—10 to 16 inches; brown (10YR 4/3) very cobbly silt loam; moderate fine and medium subangular blocky structure; friable; common very fine to medium roots; about 10 percent gravel and 30 percent cobbles; neutral; clear wavy boundary.

C—16 to 60 inches; brown (10YR 5/3) very cobbly fine sandy loam; massive; friable; few fine roots; about 30 percent gravel and 30 percent cobbles; violent effervescence; moderately alkaline.

The thickness of the solum is 15 to 25 inches. The content of coarse fragments ranges from 15 to 35 percent in the A horizon and from 30 to 60 percent in the B and C horizons.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1, or it is neutral in hue and has value of 2 to 5. The Bw horizon has chroma of 2 to 4. It is the very gravelly, very cobbly, or stony analogs of fine sandy loam, silt loam, or loam. The C horizon has value of 5 to 7 and chroma of 3 or 4. It is the very gravelly or very cobbly analogs of sandy loam, fine sandy loam, or loam.

Potagannissing Series

The Potagannissing series consists of very shallow, somewhat poorly drained soils that formed in loamy material underlain by limestone bedrock. These soils are on ground moraines and glacial lake benches. Permeability is moderate. Slopes range from 0 to 3 percent.

Potagannissing soils are similar to Ensign soils and commonly are adjacent to Ensign, Shelter, and Summerville soils. Ensign and Summerville soils are underlain by limestone bedrock at a depth of 10 to 20 inches. Shelter soils formed in loamy deposits. The well drained Summerville soils are in the higher landscape positions. The somewhat poorly drained Ensign and Shelter soils are in landscape positions similar to those of the Potagannissing soils.

Typical pedon of Potagannissing gravelly silt loam, in an area of Potagannissing-Rock outcrop complex, 0 to 3 percent slopes; 1,500 feet west and 575 feet north of the southeast corner of sec. 31, T. 43 N., R. 7 E.

A—0 to 4 inches; very dark gray (10YR 3/1) gravelly silt loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; friable; many fine and medium roots; about 20 percent gravel and 5 percent cobbles; mildly alkaline; clear smooth boundary.

C—4 to 7 inches; yellowish brown (10YR 5/4) gravelly fine sandy loam; few fine distinct pale brown (10YR 6/3) and common medium distinct yellowish brown (10YR 5/6 and 10YR 5/8) mottles; weak medium granular structure; friable; few fine roots; very dark grayish brown (10YR 3/1) worm casts in 20 percent of horizon; about 10 percent gravel and 5 percent cobbles; moderately alkaline; abrupt smooth boundary.

2R—7 inches; limestone bedrock.

The depth to bedrock ranges from 5 to 10 inches. The profile is silt loam, fine sandy loam, loam, very fine sandy loam, or the gravelly or cobbly analogs of those textures. The content of gravel ranges from 5 to 20 percent, by volume, and the content of cobbles ranges from 0 to 15 percent.

The A horizon has value of 2 or 3 and chroma of 1 to 3. Some pedons have a thin Bw horizon. This horizon has hue of 7.5YR or 10YR and value and chroma of 3 or 4. The C horizon has value of 5 or 6 and chroma of 2 to 6.

Rockbottom Series

The Rockbottom series consists of very deep, moderately well drained and well drained soils that formed in lacustrine deposits underlain by loamy-skeletal glacial till on lake plains and at the margins of lake plains and moraines. Permeability is moderately slow in the solum and moderate in the substratum. Slopes range from 0 to 35 percent.

Rockbottom soils are commonly adjacent to Posen, Rudyard, and Velvet soils. Posen and Velvet soils are in landscape positions similar to or slightly higher than those of the Rockbottom soils. Posen soils do not have an argillic horizon. Velvet soils are sandy-skeletal. Rudyard soils are clayey throughout. They are in the slightly lower landscape positions.

Typical pedon of Rockbottom stony silt loam, in an area of Velvet-Rockbottom complex, 6 to 15 percent slopes; 1,255 feet east and 2,760 feet south of the northwest corner of sec. 12, T. 47 N., R. 1 E.

A—0 to 6 inches; very dark grayish brown (10YR 3/2) stony silt loam, light brownish gray (10YR 6/2) dry; moderate medium subangular blocky structure; friable; many fine to coarse roots; about 30 percent stones; medium acid; gradual wavy boundary.

A/B—6 to 10 inches; about 75 percent very dark gray (10YR 3/1) stony silt loam (A), light brownish gray (10YR 6/2) dry; dark grayish brown (10YR 4/2) stony silt loam (B); moderate medium subangular blocky structure; friable; many fine and medium roots; about 30 percent stones; medium acid; clear wavy boundary.

Bt1—10 to 17 inches; brown (10YR 4/3) silty clay loam; medium fine subangular blocky structure; firm; common fine and medium roots; faint common dark yellowish brown (10YR 4/4) clay films on faces of peds; about 5 percent cobbles; medium acid; gradual wavy boundary.

2Bt2—17 to 29 inches; brown (10YR 4/3) extremely cobbly sandy clay loam; few fine prominent reddish brown (5YR 4/4) mottles in the lower part; weak coarse granular structure; few faint dark yellowish brown (10YR 4/4) clay films on faces of peds; friable; few fine and medium roots; about 30 percent gravel and 50 percent cobbles; medium acid; clear smooth boundary.

3C1—29 to 38 inches; pale brown (10YR 6/3) very cobbly fine sandy loam; massive; friable; about 20 percent gravel and 15 percent cobbles; neutral; clear wavy boundary.

3C2—38 to 60 inches; pale brown (10YR 6/3) very gravelly fine sandy loam; massive; friable; about 35 percent gravel and 15 percent cobbles; neutral.

The thickness of the solum ranges from 20 to 40 inches. The content of stones ranges from 15 to 35 percent in the A horizon and from 0 to 5 percent throughout the rest of the profile. In the A, A/B, and Bt horizons, the content of gravel ranges from 0 to 5 percent and the content of cobbles ranges from 0 to 10 percent. In the 2Bt and 3C horizons, the content of gravel ranges from 20 to 40 percent and the content of cobbles ranges from 15 to 50 percent.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2. The A part of the A/B horizon has colors similar to those of the A horizon. The B part has hue of 5YR, 7.5YR, or 10YR, value of 4 or 5, and chroma of 2 to 4. It is silt loam or loam.

The Bt horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 or 5, and chroma of 3 or 4. It is silty clay loam or clay loam. The 2Bt horizon has colors similar to those of the Bt horizon. It is the very gravelly, very cobbly, extremely gravelly, or extremely cobbly analogs of sandy clay loam.

The C horizon has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 3 or 4. It is the very gravelly, very cobbly, extremely gravelly, or extremely cobbly analogs of fine sandy loam or sandy loam.

Rockcut Series

The Rockcut series consists of very deep, somewhat poorly drained soils on the former flood plains along glacial rivers. These soils formed in sandy deposits underlain by stratified, loamy material. Permeability is rapid in the sandy part of the profile and moderately slow in the loamy part. Slopes range from 0 to 3 percent.

Rockcut soils are commonly adjacent to Markey and Pinconning soils. The adjacent soils are poorly drained and are lower on the landscape than the Rockcut soils. Markey soils formed in 16 to 50 inches of organic material. Pinconning soils do not have coarse fragments in the sandy upper part.

Typical pedon of Rockcut extremely stony loamy sand, in an area of Rockcut-Pinconning complex, 0 to 3 percent slopes; 2,500 feet north and 1,320 feet east of the southwest corner of sec. 11, T. 47 N., R. 1 E.

Oe—3 inches to 0; very dark brown (10YR 2/2), partially decomposed leaf litter; weak fine granular structure; very friable; many very fine to coarse roots; about 10 percent gravel, 15 percent cobbles, and 25 percent stones; strongly acid; clear wavy boundary.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) extremely stony loamy sand, grayish brown (10YR 5/2) dry; weak fine granular structure; very friable; many fine to coarse roots; about 25 percent gravel, 15 percent cobbles, and 25 percent stones; strongly acid; clear wavy boundary.

Bw—4 to 14 inches; brown (7.5YR 4/4) extremely cobbly loamy sand; common fine prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; very friable; common fine and medium roots; about 25 percent gravel and 40 percent cobbles; strongly acid; clear wavy boundary.

2BC—14 to 17 inches; grayish brown (10YR 5/2) and brown (7.5YR 5/4), stratified loamy sand, silt loam, and silty clay loam; common medium distinct strong brown (7.5YR 5/6) and prominent yellowish red (5YR 5/8) mottles; moderate medium subangular blocky structure; friable; few fine and medium roots; about 5 percent gravel and 5 percent cobbles; slightly acid; clear wavy boundary.

2C1—17 to 35 inches; grayish brown (10YR 5/2) and yellowish brown (10YR 5/4) silt loam; few fine prominent greenish gray (5GY 5/1) and many medium distinct yellowish brown (10YR 5/6) mottles; massive; firm; few fine and medium roots; neutral; clear smooth boundary.

2C2—35 to 60 inches; light brownish gray (10YR 6/2), brown (7.5YR 4/4), and reddish brown (5YR 5/4), stratified silt, silt loam, and silty clay; few fine distinct strong brown (7.5YR 5/6) and common fine prominent greenish gray (5GY 5/1) mottles; massive; firm; moderate effervescence; moderately alkaline.

The solum ranges from 15 to 32 inches in thickness. In the sandy upper part, the content of gravel ranges from 10 to 30 percent and the content of cobbles and stones ranges from 20 to 50 percent. The 2BC horizon has as much as 10 percent cobbles and 5 to 15 percent gravel.

The A horizon has value and chroma of 2 or 3. The Bw horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. It is the extremely cobbly, extremely gravelly, very cobbly, or very gravelly analogs of loamy sand, sand, or coarse sand. The 2BC horizon has hue of 5YR to 10YR, value of 4 or 5, and chroma of 2 to 4. It is stratified silt loam, loamy sand, silty clay loam, sandy loam, or the gravelly analogs of those textures. The 2C horizon has hue of 5YR to 10YR, value of 4 to 6, and chroma of 2 to 4. It is stratified silt, silt loam, silty clay loam, or silty clay.

Roscommon Series

The Roscommon series consists of very deep, poorly drained soils that formed in sandy deposits on outwash plains, on lake plains, and in glacial drainageways. Permeability is rapid. Slopes range from 0 to 2 percent.

The Roscommon soils in this county have a thicker organic surface layer and a brighter colored substratum than are defined as the range for the series. These differences, however, do not affect the use and management of the soils.

Roscommon soils are similar to Deford soils and commonly are adjacent to Au Gres and Markey soils. Deford soils formed in deposits of fine sand. Au Gres soils have a dark subsoil. They are somewhat poorly drained and are in the slightly higher landscape positions. Markey soils are very poorly drained and are in landscape positions similar to or slightly lower than those of the Roscommon soils. They formed in organic material 16 to 50 inches deep over sandy material.

Typical pedon of Roscommon muck, 100 feet north and 400 feet east of the southwest corner of sec. 4, T. 41 N., R. 3 E.

Oe—0 to 1 inch; partially decomposed leaf litter.

Oa—1 to 9 inches; black (N 2/0) muck; moderate very fine granular structure; friable; many very fine to coarse roots; medium acid; abrupt wavy boundary.

Cg—9 to 13 inches; grayish brown (10YR 5/2) sand; few fine distinct yellowish brown (10YR 5/6) mottles;

single grain; loose; few very fine to medium roots; mildly alkaline; clear wavy boundary.

C—13 to 60 inches; yellowish brown (10YR 5/4) sand; few fine distinct yellowish brown (10YR 5/6) mottles; single grain; loose; mildly alkaline.

The Oa horizon has hue of 10YR, value of 2, and chroma of 1, or it is neutral in hue and has value of 2. It is as much as 9 inches thick. Some pedons have an A horizon. This horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2. It is sand or loamy sand. The C horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 1 to 4. It is sand or loamy sand.

Rousseau Series

The Rousseau series consists of very deep, well drained soils that formed in sandy deposits on old, stabilized dunes and on lake plains and outwash plains. Permeability is rapid. Slopes range from 0 to 60 percent.

Rousseau soils are adjacent to Markey, Rubicon, and Wainola soils. Markey soils formed in 16 to 50 inches of organic material in depressions and drainageways. Rubicon soils formed in sandy material that is coarser than that in the Rousseau soils. Wainola soils are somewhat poorly drained and are lower on the landscape than the Rousseau soils.

Typical pedon of Rousseau fine sand, 6 to 15 percent slopes, 125 feet south and 200 feet west of the northeast corner of sec. 20, T. 45 N., R. 1 W.

Oa—1 inch to 0; black (10YR 2/1), well decomposed leaf litter.

A—0 to 1 inch; dark brown (7.5YR 3/2) fine sand flecked with brown (7.5YR 5/2) material; dark brown (10YR 4/3) dry; weak fine granular structure; very friable; many fine to coarse roots; very strongly acid; abrupt smooth boundary.

E—1 to 4 inches; brown (7.5YR 5/2) fine sand; weak fine subangular blocky structure; very friable; many fine to coarse roots; very strongly acid; clear wavy boundary.

Bs1—4 to 6 inches; dark brown (7.5YR 3/4) fine sand; weak fine subangular blocky structure; very friable; many fine to coarse roots; strongly acid; abrupt irregular boundary.

Bs2—6 to 15 inches; strong brown (7.5YR 5/6) fine sand; weak medium subangular blocky structure; very friable; few fine roots; medium acid; clear wavy boundary.

BC—15 to 26 inches; yellowish brown (10YR 5/6) fine sand; single grain; loose; slightly acid; gradual smooth boundary.

C—26 to 60 inches; brownish yellow (10YR 6/6) fine sand; single grain; loose; slightly acid.

The thickness of the solum ranges from 20 to 32 inches. The profile is dominantly fine sand that has a high content of very fine sand. Thin layers of loamy fine sand or sand are in some pedons.

The A horizon, if it occurs, has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 or 2, or it is neutral in hue and has value of 2 or 3. The E horizon has hue of 10YR, 7.5YR, or 5YR, value of 5 to 7, and chroma of 1 or 2. The Bs horizon has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 3 to 6. Some pedons have a thin Bhs horizon. The C horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 4 to 6. Some pedons are mottled below a depth of 30 inches.

Rubicon Series

The Rubicon series consists of very deep, excessively drained soils that formed in sandy deposits on outwash plains and ground moraines. Permeability is rapid. Slopes range from 0 to 35 percent.

Rubicon soils are commonly adjacent to Au Gres, Croswell, and Kalkaska soils. Au Gres soils are somewhat poorly drained and are in the lower landscape positions. Croswell soils are moderately well drained. Kalkaska soils have darker colors in the upper part of the subsoil than the Rubicon soils.

Typical pedon of Rubicon sand, 0 to 6 percent slopes, 330 feet south and 1,320 feet west of the northeast corner of sec. 21, T. 46 N., R. 4 W.

Oe—1 inch to 0; partially decomposed jack pine needles and grass.

A—0 to 1 inch; very dark gray (10YR 3/1) sand; weak fine granular structure; very friable; many very fine to medium roots; very strongly acid; abrupt smooth boundary.

E—1 to 3 inches; grayish brown (10YR 5/2) sand; very weak fine granular structure parting to single grain; very friable; many very fine to medium roots; very strongly acid; abrupt wavy boundary.

Bs—3 to 12 inches; brown (7.5YR 4/4) sand; very weak fine granular structure parting to single grain; very friable; common fine and medium roots; strongly acid; clear wavy boundary.

BC—12 to 20 inches; yellowish brown (10YR 5/6) sand; single grain; loose; very few fine roots; strongly acid; gradual wavy boundary.

C—20 to 60 inches; light brown (7.5YR 6/4) sand; single grain; loose; very few very fine roots; medium acid.

The thickness of the solum ranges from 20 to 32 inches. Lenses of fine sand are in the substratum in some pedons.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2. The E horizon has hue of 7.5YR or 10YR, value of 5 to 7, and chroma of 1 or 2. The Bs horizon has hue of 7.5YR or 10YR, value of 4, and chroma of 4 to 6. The C horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 3 or 4.

Rudyard Series

The Rudyard series consists of very deep, somewhat poorly drained soils that formed in clayey lacustrine deposits on lake plains. Permeability is very slow. Slopes range from 0 to 3 percent.

Rudyard soils are commonly adjacent to Ontonagon, Pickford, and Velvet soils. Ontonagon soils are moderately well drained. Pickford soils are poorly drained and are in the slightly lower landscape positions. Velvet soils formed in stony, sandy glacial till. They are on low knolls and ridges.

Typical pedon of Rudyard silty clay loam, in an area of Rudyard-Pickford silty clay loams, 0 to 3 percent slopes; 1,250 feet east and 300 feet north of the southwest corner of sec. 18, T. 46 N., R. 1 E.

Ap—0 to 6 inches; brown (10YR 4/3) silty clay loam, light gray (10YR 7/2) dry; weak medium subangular blocky structure; firm; many fine roots; neutral; abrupt smooth boundary.

B/E—6 to 9 inches; about 90 percent brown (7.5YR 5/4) silty clay loam (B); surrounded by peds of gray (10YR 5/1) and grayish brown (10YR 5/2) silt loam (E); many fine and medium distinct strong brown (7.5YR 5/6), common medium prominent dark grayish brown (10YR 4/2), and few fine prominent gray (10YR 5/1) mottles; moderate medium angular blocky structure; firm; many fine roots; neutral; abrupt irregular boundary.

Bt—9 to 17 inches; reddish brown (5YR 4/4) clay; few fine and medium prominent strong brown (7.5YR 4/6) mottles; moderate fine and very fine angular blocky structure; firm; many faint reddish brown (5YR 4/3) and prominent grayish brown (10YR 5/2) clay films on faces of peds; few fine roots; neutral; gradual wavy boundary.

C—17 to 60 inches; reddish brown (5YR 4/3) clay; few coarse prominent strong brown (7.5YR 4/6) mottles; massive; very firm; common fine greenish gray (5G 6/1) accumulations of calcium carbonate; strong effervescence; moderately alkaline.

The thickness of the solum and the depth to free carbonates range from 16 to 24 inches. The Ap horizon has value of 3 or 4 and chroma of 2 or 3. Some pedons have an A horizon that has colors similar to those of the Ap horizon. The Ap and A horizons are silty clay loam or silt loam. The B part of the B/E horizon has hue of 5YR or 7.5YR and chroma of 4 or 5. It is silty clay loam or silty clay. The E part has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 1 to 3. It is silt loam or silty clay loam. Some pedons have an E horizon that has colors similar to those of the E part of the B/E horizon. The Bt horizon has hue of 2.5YR or 5YR. The C horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 3 or 4.

Ruse Series

The Ruse series consists of shallow, poorly drained, moderately permeable or moderately rapidly permeable soils on lake benches and ground moraines. These soils formed in loamy deposits over limestone bedrock. Slopes range from 0 to 2 percent.

The Ruse soils in this county are shallower to carbonates than is defined as the range for the series. This difference, however, does not affect the use and management of the soils.

Ruse soils are commonly adjacent to Ensign, Shelter, and Summerville soils. Ensign and Shelter soils are somewhat poorly drained and are in the slightly higher landscape positions. Shelter soils have limestone bedrock below a depth of 40 inches. Summerville soils are well drained and are in the higher landscape positions.

Typical pedon of Ruse mucky fine sandy loam, 1,900 feet east and 1,400 feet north of the southwest corner of sec. 12, T. 41 N., R. 5 E.

Oi—0 to 1 inch; undecomposed leaf litter and sphagnum moss.

A—1 to 5 inches; black (N 2/0) mucky fine sandy loam, very dark gray (10YR 3/1) dry; moderate medium granular structure; friable; many very fine to coarse roots; mildly alkaline; abrupt wavy boundary.

Bw1—5 to 8 inches; brown (10YR 5/3) fine sandy loam; common medium distinct yellowish brown (10YR 5/6) and common medium faint grayish brown (10YR 5/2) mottles; weak medium subangular blocky structure; friable; common very fine and fine and few medium roots; about 10 percent gravel; slight effervescence; mildly alkaline; clear wavy boundary.

Bw2—8 to 14 inches; light brownish gray (10YR 6/2) fine sandy loam; common medium distinct brownish yellow (10YR 6/6) mottles; weak medium subangular blocky structure; friable; few very fine and fine roots; about 10 percent gravel; strong effervescence; mildly alkaline; abrupt smooth boundary.

2R—14 inches; limestone bedrock.

The depth to bedrock is 10 to 20 inches. The solum is fine sandy loam, loam, or the gravelly or cobbly analogs of those textures. The content of rock fragments ranges from 5 to 20 percent.

The A horizon has hue of 10YR, value of 2 or 3, and chroma of 1 or 2, or it is neutral in hue and has value of 2 or 3. The Bw horizon has hue of 10YR or 2.5Y, value of 4 to 6, and chroma of 1 to 4. Some pedons have a thin C horizon, and in some pedons the upper 1 to 4 inches of the bedrock is weathered.

Shelter Series

The Shelter series consists of very deep, somewhat poorly drained, very slowly permeable soils on ground moraines and glacial lake benches. These soils formed in loamy material. Slopes range from 0 to 15 percent.

Shelter soils are commonly adjacent to Alpena, Beavertail, and Potagannissing soils. Alpena soils are excessively drained and are in landscape positions similar to or slightly higher than those of the Shelter soils. Beavertail soils are poorly drained and are in the slightly lower landscape positions. Potagannissing soils have bedrock at a depth of 4 to 10 inches.

Typical pedon of Shelter very stony loam, 0 to 6 percent slopes, 2,300 feet north and 1,900 feet west of the southeast corner of sec. 7, T. 41 N., R. 7 E.

A—0 to 4 inches; black (10YR 2/1) very stony loam, very dark gray (10YR 3/1) dry; moderate medium granular structure; friable; many fine and medium roots; about 8 percent gravel, 10 percent cobbles, and 20 percent stones; moderately alkaline; abrupt smooth boundary.

A/B—4 to 6 inches; very dark gray (10YR 3/1) (A) and dark brown (10YR 3/3) (B) very stony loam, dark grayish brown (10YR 4/2) (A) and pale brown (10YR 6/3) (B) dry; moderate medium granular structure; friable; common fine and medium roots; few medium and fine vesicular pores; about 26 percent gravel, 15 percent cobbles, and 25 percent stones; moderately alkaline; abrupt smooth boundary.

Bw—6 to 12 inches; light yellowish brown (2.5Y 6/4) very cobbly fine sandy loam; common medium prominent strong brown (7.5YR 5/8) mottles; weak very fine subangular blocky structure; friable; few fine roots; common medium and fine vesicular pores; about 15 percent gravel, 20 percent cobbles, and 5 percent stones; slight effervescence; moderately alkaline; clear wavy boundary.

Cd1—12 to 26 inches; light brownish gray (2.5Y 6/2) very cobbly fine sandy loam; many medium prominent brownish yellow (10YR 6/6 and 6/8) mottles; moderate medium platy fragments; very firm; few fine roots; few fine and very fine vesicular pores; about 25 percent gravel, 20 percent cobbles, and 5 percent stones; violent effervescence; strongly alkaline; clear wavy boundary.

Cd2—26 to 60 inches; light brownish gray (2.5Y 6/2) very cobbly fine sandy loam; few fine prominent brownish yellow (10YR 6/6) mottles; moderate medium platy fragments; very firm; few fine and very fine vesicular pores; about 20 percent gravel, 20 percent cobbles, and 5 percent stones; violent effervescence; strongly alkaline.

The thickness of the solum ranges from 8 to 16 inches. The control section has more than 40 percent carbonates, by weight. In the surface layers, the content of gravel is 5 to 25 percent and the content of cobbles and stones is 15 to 40 percent. The subsoil and substratum have 15 to 40 percent gravel and 20 to 40 percent cobbles and stones. Limestone bedrock is below a depth of 40 inches in some pedons.

The A horizon has value of 2 or 3 and chroma of 1 or 2, or it is neutral in hue and has value of 2 or 3. Some pedons have an Oe or Oa horizon 1 to 3 inches thick. The A part of the A/B horizon has colors similar to those of the A horizon. The B part has value and chroma of 3 or 4. The A/B horizon is the stony, cobbly, gravelly, very stony, very cobbly, or very gravelly analogs of fine sandy loam, loam, or silt loam.

The Bw horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 3 or 4. The Cd horizon has hue of 10YR or 2.5Y, value of 5 or 6, and chroma of 2 to 4. The Bw and C horizons are the very gravelly or very cobbly analogs of fine sandy loam, loam, silt loam, or sandy loam.

Solona Series

The Solona series consists of very deep, somewhat poorly drained soils that formed in loamy glacial till on ground moraines. Permeability is moderate. Slopes range from 0 to 3 percent.

The Solona soils in this county are taxadjuncts to the series because they do not have low-chroma mottles in the argillic horizon. This difference, however, does not affect the use and management of the soils.

Solona soils are commonly adjacent to Menominee, Pickford, and Posen soils. Menominee soils are well drained and are on side slopes and low knolls. They formed in sandy deposits over loamy deposits. Pickford soils formed in clayey deposits. They are poorly drained and are in depressions and drainageways. Posen soils are well drained. They formed in loamy deposits on ridges and knolls.

Typical pedon of Solona fine sandy loam, 0 to 3 percent slopes, 2,500 feet east and 25 feet north of the southwest corner of sec. 29, T. 44 N., R. 1 W.

A—0 to 3 inches; black (10YR 2/1) fine sandy loam, dark gray (10YR 4/1) dry; weak fine granular structure; friable; many fine to coarse roots; about 5 percent gravel and 5 percent cobbles; medium acid; abrupt smooth boundary.

BE—3 to 9 inches; dark brown (10YR 4/3) fine sandy loam; moderate medium granular structure; friable; many fine to coarse roots; about 10 percent gravel and 3 percent cobbles; slightly acid; clear wavy boundary.

B/E—9 to 20 inches; about 90 percent dark yellowish brown (10YR 4/4) fine sandy loam (B); few faint dark yellowish brown (10YR 4/4) clay films on faces of peds and in pores; surrounded by peds of brown (10YR 3/3) fine sandy loam (E); many medium distinct yellowish brown (10YR 5/6) mottles; moderate medium and coarse subangular blocky structure; friable; common fine and medium roots; many fine vesicular pores; about 10 percent gravel and 3 percent cobbles; neutral; gradual wavy boundary.

C—20 to 60 inches; yellowish brown (10YR 5/4) gravelly fine sandy loam; few fine prominent strong brown (7.5YR 5/6) mottles; massive; friable; about 15 percent gravel and 5 percent cobbles; strong effervescence; moderately alkaline.

The solum ranges from 20 to 40 inches in thickness. It is fine sandy loam, sandy loam, or loam. The content of gravel ranges from 0 to 15 percent in the solum and from 0 to 25 percent in the substratum. The content of cobbles is 0 to 5 percent throughout the profile.

The A horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 or 2. The E horizon, if it occurs, has hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 2 or 3. The BE horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. The B part of the B/E horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 to 6. The E part has hue of 10YR or 7.5YR and chroma of 2 or 3. Some pedons have a Bt horizon that has colors and textures similar to those of the B part of the B/E horizon. The C horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. It is fine sandy loam, sandy loam, loam, or the gravelly analogs of those textures.

Soo Series

The Soo series consists of very deep, poorly drained soils on lake plains. These soils formed in stratified, loamy lacustrine deposits. Permeability is slow. Slopes range from 0 to 2 percent.

Soo soils are commonly adjacent to Bowers, Fibre, and Pickford soils. Bowers soils are somewhat poorly drained and are in the slightly higher landscape positions. Fibre and Pickford soils are poorly drained and are in landscape positions similar to those of the Soo soils. Fibre soils formed in sandy sediments 15 to 30 inches deep over clayey deposits. Pickford soils do not have an argillic horizon.

Typical pedon of Soo silty clay loam, 450 feet south and 2,200 feet west of the northeast corner of sec. 22, T. 44 N., R. 3 W.

Ap—0 to 7 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 6/1) dry; common medium prominent brownish yellow (10YR 6/8) and strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure parting to moderate medium granular; friable; many fine to coarse roots; slightly acid; clear smooth boundary.

Bw—7 to 17 inches; dark brown (7.5YR 4/4) silty clay loam; common medium distinct strong brown (7.5YR 5/6) and common fine prominent gray (5YR 5/1) mottles; very coarse angular blocky structure; very firm; common fine and few coarse roots; mildly alkaline; clear wavy boundary.

C1—17 to 26 inches; reddish brown (5YR 5/3) silty clay loam that has thin bands of pinkish gray (5YR 7/2) silt loam; common medium prominent strong brown (7.5YR 5/8) and yellowish brown (10YR 5/6) mottles; weak thick platy fragments; firm; few fine roots; greenish gray (5GY 6/1) clay films in root channels; violent effervescence; moderately alkaline; clear smooth boundary.

C2—26 to 60 inches; reddish brown (5YR 5/3) silty clay loam that has thin bands of pinkish gray (5YR 7/2) silt loam; few medium prominent brownish yellow (10YR 6/6) mottles; massive; firm; few fine roots in the upper 20 inches; greenish gray (5GY 6/1) silt coatings in root channels; violent effervescence; moderately alkaline.

The depth to carbonates ranges from 15 to 25 inches. The content of coarse fragments ranges from 0 to 2 percent throughout the profile.

The Ap horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2. Some pedons have an A horizon. The Bw horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. The C horizon has hue of

5YR or 7.5YR, value of 4 to 7, and chroma of 2 to 6. It is predominantly silty clay loam that has thin bands of silt loam, silt, and silty clay.

Sugar Series

The Sugar series consists of very deep, moderately well drained and well drained soils on lake plains. These soils formed in loamy lacustrine sediments underlain by clayey material. Permeability is moderate in the upper part of the profile and very slow in the lower part. Slopes range from 0 to 50 percent.

Sugar soils are commonly adjacent to Soo, Gogomain, and Rudyard soils. Soo and Gogomain soils are poorly drained and are in depressions and drainageways. Soo soils are clayey. Rudyard soils are somewhat poorly drained and are in the lower landscape positions. They formed in clayey deposits.

Typical pedon of Sugar very fine sandy loam, 0 to 6 percent slopes, 2,380 feet south and 1,400 feet west of the northeast corner of sec. 1, T. 44 N., R. 3 W.

Oa—1 inch to 0; black (10YR 2/1), well decomposed forest litter; moderate medium granular structure; very friable; many fine and medium roots; strongly acid; abrupt smooth boundary.

A—0 to 3 inches; black (10YR 2/1) very fine sandy loam, gray (10YR 5/1) dry; moderate medium granular structure; very friable; many fine to coarse roots; strongly acid; abrupt wavy boundary.

E—3 to 10 inches; pinkish gray (5YR 7/2) loamy very fine sand; weak medium and fine subangular blocky structure; very friable; common fine and medium roots; slightly acid; abrupt wavy boundary.

Bs1—10 to 11 inches; dark brown (7.5YR 4/4) very fine sandy loam; strong thick platy structure; firm; many fine and medium roots; slightly acid; clear wavy boundary.

Bs2—11 to 14 inches; strong brown (7.5YR 4/6) very fine sandy loam; strong thick platy structure; firm; many fine and medium roots; slightly acid; clear wavy boundary.

Bs3—14 to 19 inches; strong brown (7.5YR 5/8) very fine sandy loam; moderate medium platy structure; firm; common fine roots; slightly acid; clear smooth boundary.

Bw—19 to 26 inches; yellowish brown (10YR 5/6) and light brown (7.5YR 6/4) loamy very fine sand; few fine distinct strong brown (7.5YR 5/8) mottles; moderate medium platy structure; firm; few fine roots; neutral; abrupt smooth boundary.

2B/E—26 to 34 inches; reddish brown (5YR 5/4) silt loam (Bt) with interfingering of white (5YR 8/1) loamy very fine sand (E); few fine prominent strong brown (7.5YR 5/6) mottles; moderate medium angular blocky structure; firm; few fine and medium roots; many medium and fine vesicular pores; few faint reddish brown (5YR 5/4) clay films on vertical and horizontal faces of peds; mildly alkaline; abrupt smooth boundary.

2Bt—34 to 45 inches; reddish brown (5YR 5/4) silty clay loam; common fine prominent strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to weak coarse angular blocky; firm; few fine and medium roots; many fine vesicular pores; many faint reddish brown (5YR 5/4) clay films on vertical and horizontal faces of peds; mildly alkaline; abrupt smooth boundary.

2C—45 to 60 inches; reddish brown (5YR 4/4) clay that has thin bands of light reddish brown (5YR 6/3) silt loam; moderate fine angular blocky structure; firm; many fine vesicular pores; common thin pinkish gray (7.5YR 7/2) silt coatings on horizontal faces of peds; slight effervescence; moderately alkaline.

The solum ranges from 30 to 50 inches in thickness. The loamy cap ranges from 20 to 40 inches in thickness.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 to 3. The Ap horizon, if it occurs, has hue of 7.5YR or 10YR, value of 2 to 4, and chroma of 1 to 3. It is very fine sandy loam or loamy very fine sand. The E horizon has hue of 5YR, 7.5YR, or 10YR, value of 6 or 7, and chroma of 2 or 3. It is loamy very fine sand or very fine sand.

The Bs horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 4 to 8. It is silt loam, very fine sandy loam, very fine sand, or loamy very fine sand. The Bw horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 4 to 6. It is very fine sandy loam or loamy very fine sand.

The B part of the B/E horizon has value and chroma of 4 to 6. The E part has hue of 5YR or 7.5YR, value of 6 to 8, and chroma of 1 or 2. The B/E horizon is loamy very fine sand, silt loam, or very fine sandy loam. The 2Bt horizon has value of 4 or 5. It is silty clay loam, silty clay, or clay.

The 2C horizon has value of 3 to 6 and chroma of 3 or 4. It is silty clay or clay that has thin bands of silt loam or silt.

Summerville Series

The Summerville series consists of shallow, well drained, moderately permeable soils on ground moraines and glacial lake benches. These soils formed in loamy material 10 to 20 inches deep over limestone bedrock. Slopes range from 1 to 45 percent.

Summerville soils are commonly adjacent to Ensign, Potagannissing, Longrie, and Posen soils. Ensign and Potagannissing soils are somewhat poorly drained and are lower on the landscape than the Summerville soils. Potagannissing soils are less than 10 inches deep over bedrock. Longrie and Posen soils are in landscape positions similar to those of the Summerville soils. Longrie soils formed in loamy material 20 to 40 inches deep over bedrock and have a spodic horizon. Posen soils do not have bedrock within a depth of 40 inches.

Typical pedon of Summerville loam, in an area of Summerville-Rock outcrop complex, 1 to 15 percent slopes; 2,800 feet east and 400 feet south of the northwest corner of sec. 28, T. 42 N., R. 6 E.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) loam, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; very friable; many very fine to medium roots; slightly acid; abrupt wavy boundary.

Bw1—3 to 9 inches; dark yellowish brown (10YR 4/4) very fine sandy loam; moderate fine angular blocky structure; very friable; common fine and medium roots; medium acid; clear wavy boundary.

Bw2—9 to 13 inches; dark yellowish brown (10YR 4/6) very fine sandy loam; moderate fine angular blocky structure; very friable; common fine and medium roots; medium acid; abrupt smooth boundary.

R—13 inches; limestone bedrock.

The depth to limestone bedrock is 10 to 20 inches. The content of gravel and cobbles ranges from 0 to 35 percent. The profile is sandy loam, fine sandy loam, very fine sandy loam, silt loam, loam, or the cobbly analogs of those textures.

The A horizon has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2, or it is neutral in hue and has value of 2 or 3. Some pedons have an E horizon. This horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 or 3. The Bw horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2 to 6.

Superior Series

The Superior series consists of very deep, well drained soils that formed in loamy deposits over clayey deposits. These soils are on lake plains and ground moraines. Permeability is moderately rapid in the upper part of the profile and very slow in the lower part. Slopes range from 1 to 6 percent.

Superior soils are commonly adjacent to Allendale, Ontonagon, and Rudyard soils. Allendale soils are somewhat poorly drained and are in the lower landscape positions. Ontonagon soils are finer textured than the Superior soils. They are in landscape positions similar to those of the Superior soils. Rudyard soils are somewhat poorly drained and are in the slightly lower landscape positions.

Typical pedon of Superior fine sandy loam, 1 to 6 percent slopes, 1,700 feet south and 260 feet east of the northwest corner of sec. 10, T. 47 N., R. 6 W.

Oi—2 inches to 0; hardwood leaf litter and live roots.

E—0 to 2 inches; pinkish gray (7.5YR 6/2) fine sandy loam; moderate fine subangular blocky structure; very friable; many very fine to coarse roots; medium acid; clear smooth boundary.

Bhs—2 to 5 inches; dark reddish brown (5YR 3/2) fine sandy loam; moderate fine subangular blocky structure; very friable; many very fine to coarse roots; strongly acid; clear smooth boundary.

Bs—5 to 10 inches; brown (7.5YR 4/4) fine sandy loam; moderate medium subangular blocky structure; very friable; common fine and medium roots; strongly acid; abrupt smooth boundary.

E/B—10 to 14 inches; about 80 percent brown (7.5YR 5/2) fine sandy loam (E); surrounding peds of reddish brown (5YR 4/4) clay loam (B); strong fine and medium subangular blocky structure; friable; few fine roots; common fine vesicular pores; medium acid; gradual wavy boundary.

2B/E—14 to 26 inches; about 80 percent reddish brown (5YR 4/4) silty clay (B); light reddish brown (5YR 6/3) coatings of fine sandy loam (E); strong fine and medium subangular blocky structure; firm; few medium and fine vesicular pores; common faint reddish brown (5YR 4/3) clay films on faces of peds; medium acid; gradual wavy boundary.

2Bt—26 to 36 inches; reddish brown (2.5YR 4/4) clay; strong fine and medium angular blocky structure; very firm; common faint reddish brown (2.5YR 4/4) clay films on faces of peds; slightly acid; gradual wavy boundary.

2C—36 to 60 inches; reddish brown (2.5YR 4/4) clay; massive; very firm; neutral.

The thickness of the solum ranges from 24 to 40 inches. The loamy upper part is 10 to 20 inches thick.

Some pedons have an A horizon. This horizon has hue of 10YR or 7.5YR, value of 2 or 3, and chroma of 1 to 3. The E horizon has value of 5 or 6 and chroma of 2 or 3.

The Bhs horizon has hue of 5YR or 7.5YR and value and chroma of 2 or 3. The Bs horizon has hue of 5YR or 7.5YR and value and chroma of 3 or 4. The Bhs and Bs horizons are fine sandy loam, sandy loam, or loam.

The E part of the E/B and 2B/E horizons has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 2 or 3. The B part has hue of 5YR or 2.5YR and value and chroma of 4 or 5. The E part is fine sandy loam or loam, and the B part is clay loam, silty clay, or clay. The 2Bt horizon has hue of 2.5YR or 5YR and value and chroma of 4 or 5. It is silty clay or clay. Reaction is medium acid or slightly acid.

The 2C horizon has hue of 2.5YR or 5YR and value and chroma of 4 or 5. It is clay or silty clay.

Velvet Series

The Velvet series consists of very deep, moderately well drained and well drained soils that formed in sandy and loamy glacial till on ground moraines and end moraines. These soils have a fragipan. Permeability is rapid in the sandy upper part of the profile, very slow in the fragipan, and moderate in the loamy material. Slopes range from 0 to 35 percent.

Velvet soils are commonly adjacent to Rockbottom, Pickford, and Westbury soils. Rockbottom soils formed in clayey deposits over loamy deposits. They are in landscape positions similar to those of the Velvet soils. Pickford soils formed in clayey deposits. They are poorly drained and are lower on the landscape than the Velvet soils. Westbury soils are somewhat poorly drained. They formed in loamy deposits in the slightly lower landscape positions.

Typical pedon of Velvet very stony loamy sand, in an area of Velvet-Rockbottom complex, 6 to 15 percent slopes; 1,800 feet north and 780 feet west of the southeast corner of sec. 36, T. 48 N., R. 1 E.

Oa—2 inches to 0; black (10YR 2/1), well decomposed leaf litter; moderate medium granular structure; very friable; many fine and medium roots; about 5 percent cobbles and 25 percent stones; strongly acid; abrupt wavy boundary.

E—0 to 3 inches; grayish brown (10YR 5/2) very stony loamy sand; single grain; loose; common fine roots; about 25 percent gravel, 10 percent cobbles, and 20 percent stones; strongly acid; clear wavy boundary.

Bs1—3 to 13 inches; dark brown (7.5YR 3/4) very stony loamy sand; weak medium and fine subangular blocky structure; very friable; common fine roots; about 25 percent gravel, 10 percent cobbles, and 20 percent stones; medium acid; clear wavy boundary.

Bs2—13 to 16 inches; strong brown (7.5YR 5/6) very cobbly loamy sand; single grain; loose; few fine and coarse roots; few fine chunks of weakly cemented ortstein; about 25 percent gravel, 25 percent cobbles, and 5 percent stones; medium acid; clear smooth boundary.

2Ex/Bx—16 to 41 inches; about 80 percent grayish brown (10YR 5/2) gravelly loamy sand (E); surrounding peds of reddish brown (2.5YR 4/4) gravelly fine sandy loam (B); common coarse prominent strong brown (7.5YR 5/6) and common medium prominent yellowish red (5YR 5/6) mottles; strong medium platy structure; very firm and brittle when moist; many very fine and fine vesicular pores; few faint dark brown (10YR 4/3) clay films on horizontal faces of peds and in pores; about 20 percent gravel, 5 percent cobbles, and 5 percent stones; slightly acid; clear wavy boundary.

2C—41 to 60 inches; brown (10YR 5/3) gravelly fine sandy loam; massive; friable; about 10 percent gravel and 5 percent cobbles; neutral.

The thickness of the solum ranges from 20 to more than 60 inches. Depth to the fragipan ranges from 15 to 25 inches. In the solum, the content of gravel ranges from 15 to 35 percent and the content of cobbles and stones ranges from 10 to 50 percent. In the 2C horizon, the content of gravel ranges from 10 to 25 percent and the content of cobbles and stones ranges from 5 to 30 percent.

Some pedons have an A horizon. This horizon is 2 to 5 inches thick. It has hue of 7.5YR or 10YR, value of 2 or 3, and chroma of 1 or 2. The E horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 or 3.

The Bs horizon has hue of 5YR or 7.5YR, value of 3 to 5, and chroma of 4 to 6. It is the gravelly, cobbly, very gravelly, or very cobbly analogs of loamy sand or loamy fine sand. The E part of the 2Ex/Bx horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 2 or 3. The B part has hue of 2.5YR to 10YR, value of 4 to 6, and chroma of 3 or 4. The 2Ex/Bx horizon is the gravelly, cobbly, very gravelly, or very cobbly analogs of loamy sand, loamy fine sand, sandy loam, fine sandy loam, or very fine sandy loam. Some pedons have an Ex horizon. The fragipan is very hard or extremely hard when dry and very firm or extremely firm when moist.

The C horizon has hue of 5YR, 7.5YR, or 10YR, value of 5 or 6, and chroma of 3 to 6. It is the gravelly, very gravelly, cobbly, or very cobbly analogs of fine sandy loam, sandy loam, loamy fine sand, or loamy sand.

Wainola Series

The Wainola series consists of very deep, somewhat poorly drained soils that formed in sandy deposits on outwash plains and lake plains. Permeability is rapid. Slopes range from 0 to 3 percent.

Wainola soils are commonly adjacent to Rousseau, Kinross, and Markey soils. Rousseau soils are well drained and are in the higher landscape positions. Kinross soils are poorly drained and are in the lower landscape positions. Markey soils are very poorly drained and are in depressions and drainageways. They formed in organic material 16 to 50 inches deep over sand.

Typical pedon of Wainola fine sand, 0 to 3 percent slopes, 400 feet west and 260 feet south of the northeast corner of sec. 31, T. 47 N., R. 1 W.

Oe—3 inches to 0; black (N 2/0), partially decomposed leaf litter; many fine to coarse roots; strongly acid; abrupt wavy boundary.

E—0 to 5 inches; grayish brown (10YR 5/2) fine sand; moderate medium subangular blocky structure; very friable; many fine and medium roots; strongly acid; abrupt irregular boundary.

Bhs—5 to 7 inches; dark reddish brown (5YR 3/2) fine sand; few coarse prominent dark brown (7.5YR 3/4) mottles; moderate very thick platy structure parting to moderate medium subangular blocky; friable; many fine and medium roots; strongly acid; abrupt irregular boundary.

Bs—7 to 19 inches; strong brown (7.5YR 5/6) fine sand; common medium distinct yellowish red (5YR 4/6) mottles; moderate very thick platy structure parting to moderate medium subangular blocky; friable; few fine roots; medium acid; abrupt wavy boundary.

BC—19 to 24 inches; yellowish brown (10YR 5/6) fine sand; common medium distinct strong brown (7.5YR 4/6) mottles; moderate thick platy structure parting to moderate medium and fine subangular blocky; friable; medium acid; clear wavy boundary.

C—24 to 60 inches; brown (10YR 5/3) fine sand; massive; very friable; medium acid.

The solum ranges from 20 to 35 inches in thickness. The profile is dominantly fine sand, but in some pedons the B and C horizons are stratified fine sand that has thin layers of loamy fine sand.

Some pedons have an A horizon. This horizon has hue of 10YR or 7.5YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. The E horizon has hue of 10YR or 7.5YR, value of 5 or 6, and chroma of 2 or 3. The Bhs horizon has hue of 7.5YR or 5YR and value and chroma of 2 or 3. The Bs horizon has hue of 7.5YR or 5YR, value of 3 to 5, and chroma of 2 to 6. Some pedons do not have a Bhs horizon. The C horizon has hue of 10YR or 7.5YR, value of 5 to 7, and chroma of 2 to 4.

Waiska Series

The Waiska series consists of very deep, excessively drained soils that formed in gravelly and sandy deposits on glacial lake benches, stream terraces, and outwash plains. Permeability is very rapid. Slopes range from 0 to 6 percent.

The Waiska soils in this county have a thinner Bhs horizon than is defined as the range for the series. This difference, however, does not affect the use and management of the soils.

Waiska soils are commonly adjacent to Kalkaska soils. Kalkaska soils do not have so much gravel as the Waiska soils. They are in landscape positions similar to those of the Waiska soils.

Typical pedon of Waiska sandy loam, 0 to 6 percent slopes, 400 feet east and 500 feet south of the northwest corner of sec. 20, T. 47 N., R. 3 W.

Oe—1 inch to 0; black (N 2/0), partially decomposed leaf litter; weak fine subangular blocky structure; friable; many fine roots; very strongly acid; abrupt smooth boundary.

E—0 to 2 inches; reddish gray (5YR 5/2) sandy loam; weak fine subangular blocky structure; very friable; many fine to coarse roots; about 4 percent gravel and 3 percent cobbles; very strongly acid; abrupt smooth boundary.

Bhs—2 to 4 inches; dark reddish brown (5YR 3/2) gravelly sandy loam; weak fine subangular blocky structure; very friable; many fine to coarse roots; about 10 percent pebbles and 5 percent cobbles; strongly acid; clear wavy boundary.

Bs1—4 to 8 inches; dark brown (7.5YR 3/4) gravelly sandy loam; weak fine subangular blocky structure; very friable; many fine to coarse roots; about 10 percent gravel and 5 percent cobbles; medium acid; clear wavy boundary.

Bs2—8 to 15 inches; dark brown (7.5YR 4/4) very gravelly loamy coarse sand; single grain; loose; common fine and medium roots; about 45 percent gravel and 2 percent cobbles; medium acid; clear wavy boundary.

BC—15 to 31 inches; strong brown (7.5YR 5/6) very gravelly coarse sand; single grain; loose; few fine roots; about 55 percent gravel and 2 percent cobbles; medium acid; gradual wavy boundary.

C—31 to 60 inches; dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) very gravelly coarse sand; single grain; loose; about 55 percent gravel and 2 percent cobbles; medium acid.

The thickness of the solum ranges from 30 to 50 inches. The content of rock fragments ranges from 5 to

60 percent in the upper 10 inches and from 35 to 60 percent throughout the rest of the profile. Cobbles make up less than 10 percent of the rock fragments throughout the profile.

Some pedons have an A horizon. This horizon has hue of 5YR, 7.5YR, or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. The E horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 1 or 2. It commonly is thin and discontinuous.

The Bhs horizon has chroma of 2 or 3. The Bs horizon has value of 3 or 4 and chroma of 4 to 6. The Bhs and Bs horizons are sand, loamy sand, sandy loam, loamy coarse sand, or the gravelly or very gravelly analogs of those textures.

The C horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 or 5, and chroma of 3 to 6. The C horizon is coarsely stratified in many pedons.

Wega Series

The Wega series consists of very deep, somewhat poorly drained, moderately slowly permeable soils on the former flood plains along glacial rivers. These soils formed in loamy deposits. Slopes range from 0 to 3 percent.

Wega soils are commonly adjacent to Ermatinger and Pickford soils. Ermatinger and Pickford soils are poorly drained and are in the lower landscape positions. Pickford soils formed in clayey deposits.

Typical pedon of Wega very fine sandy loam, 0 to 3 percent slopes, 2,300 feet east and 75 feet north of the southwest corner of sec. 26, T. 47 N., R. 1 E.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) very fine sandy loam, light brownish gray (10YR 6/2) dry; weak and moderate medium subangular blocky structure; friable; common fine to coarse roots; medium acid; clear smooth boundary.

C1—9 to 18 inches; light yellowish brown (10YR 6/4) very fine sandy loam; common medium distinct yellowish brown (10YR 5/6) and common medium faint yellowish brown (10YR 5/4) mottles; weak medium platy structure parting to weak very fine subangular blocky; friable; few fine and medium roots; many fine pores; medium acid; clear smooth boundary.

C2—18 to 24 inches; pale brown (10YR 6/3) and brown (7.5YR 5/4) very fine sandy loam; common medium distinct yellowish brown (10YR 5/6) and common medium faint light brownish gray (10YR 6/2) mottles; weak medium platy structure; friable; few medium roots; common fine pores; slightly acid; clear smooth boundary.

C3—24 to 27 inches; strong brown (7.5YR 4/6) and pale brown (10YR 6/3) loamy very fine sand; massive; friable; few medium roots; common fine pores; neutral; clear smooth boundary.

C4—27 to 55 inches; pale brown (10YR 6/3) very fine sandy loam; common fine faint light brownish gray (10YR 6/2) mottles in the matrix and common fine prominent strong brown (7.5YR 5/6) mottles in root channels and pores; massive; friable; common fine pores; mildly alkaline; clear smooth boundary.

Cg—55 to 60 inches; dark gray (10YR 4/1) very fine sandy loam; few medium prominent strong brown (7.5YR 4/6) mottles in old root channels; massive; friable; mildly alkaline.

The solum ranges from 15 to 25 inches in thickness. It is very fine sandy loam, silt loam, or loamy very fine sand. The E, Bw, and C horizons commonly have faint color bands.

The Ap horizon has hue of 7.5YR or 10YR and value of 3 or 4. The E horizon has hue of 7.5YR or 10YR, value of 5 or 6, and chroma of 3 or 4. The C horizon has hue of 5YR, 7.5YR, or 10YR, value of 4 to 6, and chroma of 3 or 4. The Cg horizon has value of 3 to 5 and chroma of 1 or 2. The C and Cg horizons are very fine sandy loam, loamy very fine sand, or silt loam. Organic stains and charcoal fragments are common below a depth of 25 inches.

Westbury Series

The Westbury series consists of very deep, somewhat poorly drained soils that formed in sandy and loamy glacial till on ground moraines. These soils have a fragipan. Permeability is very slow in the fragipan and moderate in the rest of the profile. Slopes range from 0 to 3 percent.

Westbury soils are commonly adjacent to Gay, Oldman, Pickford, and Velvet soils. The very poorly drained Gay and poorly drained Pickford soils are in depressions and drainageways. Pickford soils are clayey. The moderately well drained Oldman and Velvet soils are in the slightly higher landscape positions. Velvet soils are sandy-skeletal.

Typical pedon of Westbury stony fine sandy loam, 0 to 3 percent slopes, 500 feet east and 75 feet south of the northwest corner of sec. 4, T. 47 N., R. 2 E.

Oe—3 to 2 inches; very dark gray (5YR 3/1), partially decomposed leaf litter; many fine and medium roots; about 5 percent cobbles and 10 percent stones; very strongly acid; abrupt smooth boundary.

Oa—2 inches to 0; black (N 2/0), well decomposed leaf litter; moderate fine granular structure; very friable; about 5 percent cobbles and 10 percent stones;

many fine and medium roots; very strongly acid; clear wavy boundary.

E—0 to 1 inch; reddish gray (5YR 6/2) stony fine sandy loam; moderate medium subangular blocky structure; about 5 percent cobbles and 10 percent stones; many fine to coarse roots; very strongly acid; abrupt broken boundary.

Bhs1—1 to 4 inches; dark brown (10YR 3/3) cobbly silt loam; few fine distinct dark yellowish brown (10YR 4/6) mottles; moderate medium subangular blocky structure; friable; many fine to coarse roots; about 5 percent gravel and 12 percent cobbles; strongly acid; clear wavy boundary.

Bhs2—4 to 8 inches; dark brown (10YR 3/3) cobbly fine sandy loam; few fine distinct dark yellowish brown (10YR 4/6) mottles; moderate medium and fine subangular blocky structure; friable; many fine to coarse roots; about 10 percent gravel and 10 percent cobbles; strongly acid; clear smooth boundary.

Bs—8 to 13 inches; dark yellowish brown (10YR 4/4) gravelly fine sandy loam; common medium distinct yellowish brown (10YR 5/6) and dark yellowish brown (10YR 4/6) mottles; moderate medium and fine subangular blocky structure; friable; common fine and medium roots; about 15 percent gravel and 5 percent cobbles; strongly acid; clear smooth boundary.

Ex/Bx—13 to 45 inches; about 80 percent light brown (7.5YR 6/4) very gravelly sandy loam (E); surrounding peds of brown (7.5YR 4/4) very gravelly sandy loam (B); few medium distinct strong brown (7.5YR 5/6) mottles; strong medium platy structure; very firm and brittle when moist; about 40 percent gravel and 2 percent cobbles; strongly acid; gradual wavy boundary.

C—45 to 60 inches; light brown (7.5YR 6/4) very gravelly sandy loam; common coarse prominent yellowish brown (10YR 5/6) mottles; massive; friable; about 40 percent gravel and 2 percent cobbles; medium acid.

The thickness of the solum ranges from 20 to 50 inches. Depth to the fragipan ranges from 10 to 20 inches. Above the fragipan, the content of gravel ranges from 0 to 20 percent and the content of cobbles and stones ranges from 5 to 15 percent, by volume. The fragipan and the C horizon have 15 to 40 percent gravel and 2 to 25 percent cobbles and stones, by volume.

Some pedons have an A horizon. This horizon has hue of 7.5YR or 10YR or is neutral in hue. It has value of 2 or 3 and chroma of 0 to 2. The E horizon has hue of 5YR, 7.5YR, or 10YR, value of 5 or 6, and chroma of 1 to 4. It has textures similar to those of the A horizon.

The Bhs horizon has hue of 7.5YR or 10YR and value and chroma of 2 or 3. It is fine sandy loam, sandy loam, silt loam, or the gravelly or cobbly analogs of those textures. The Bs horizon has hue of 7.5YR or 10YR, value of 3 to 5, and chroma of 4 to 6. It has textures similar to those of the Bhs horizon.

The E part of the Ex/Bx horizon has hue of 5YR, 7.5YR, or 10YR, value of 5 or 6, and chroma of 2 to 4. The B part has hue of 2.5YR, 5YR, or 7.5YR, value of 4 or 5, and chroma of 3 or 4. The Ex/Bx horizon is the gravelly, very gravelly, or cobbly analogs of fine sandy loam, loamy fine sand, or sandy loam. Some pedons have an Ex horizon. The fragipan is very hard when dry and very firm when moist.

The C horizon has hue of 5YR or 7.5YR, value of 5 or 6, and chroma of 2 to 4. It has textures similar to those of the Ex/Bx horizon.

Formation of the Soils

This section relates the five major factors of soil formation to the soils in the survey area. It also explains the processes of soil formation.

Factors of Soil Formation

Soil forms through the interaction of five major factors—the physical, chemical, and mineralogical composition of the parent material; the climate under which the soil material has accumulated and existed since accumulation; the plant and animal life on and in the soil; the relief, or lay of the land; and the length of time that the processes of soil formation have acted on the parent material *(4)*.

Climate and plant and animal life are the active forces of soil formation. They slowly change the parent material into a natural body of soil that has genetically related layers, called horizons. The effects of climate and plant and animal life are conditioned by relief. The nature of a parent material affects the kind of soil profile that forms and, in extreme cases, determines it almost entirely. Finally, time is needed for the differentiation of soil horizons.

The factors of soil formation are so closely interrelated in their effects on the soils that few generalizations can be made regarding the effect of any one factor unless conditions are specified for the other four.

Parent Material

Parent material is the unconsolidated mass in which a soil forms. It affects the limits of the chemical and mineralogical composition of the soil. In this survey area, nearly all of the parent materials were deposited by glaciers or glacial meltwater that covered the county about 10,000 years ago. Although most of the parent materials in Chippewa County are of common glacial origin, their properties vary greatly, sometimes within small areas, depending on how the materials were deposited.

The dominant parent materials in Chippewa County were deposited as glacial till, lacustrine material, outwash material, eolian material, alluvium, and organic material. The soil mantle ranges from a few inches to more than 100 feet in thickness. In many areas near Lake Huron, limestone bedrock is at a shallow depth or is exposed.

Glacial till was deposited directly by glaciers with minimal water action. It is a mixture of particles of different sizes. The small pebbles in glacial till have sharp corners, indicating that they have not been worn by water. Posen, Oldman, and Shelter are examples of soils that formed in glacial till on till plains and moraines.

Lacustrine material was deposited from still, or ponded, glacial meltwater. It consists of fine soil particles, such as very fine sand, silt, and clay, that settled out in still water. Alcona soils are an example of lacustrine soils that formed in very fine sand and silt deposits, and Rudyard soils are an example of lacustrine soils that formed in clay deposits.

Outwash material was deposited by running water from melting glaciers. The size of the particles depends on the speed of the stream that carried the material. The water deposited the coarser particles as it slowed down. Slowly moving water carried the finer particles, such as very fine sand, silt, and clay. Outwash deposits generally occur as layers of particles of similar size, such as sand, gravel, or other coarse particles. Kalkaska and Guardlake soils are examples of soils that formed in deposits of outwash material.

Eolian material was deposited by wind action. It consists of sand deposited on dunes. Deer Park soils are examples of soils that formed from eolian material.

Alluvium is material recently deposited by floodwater from streams. This material varies in texture, depending on the speed of the water from which it was deposited. In this survey area, the Entisols, flooded, are an example of soils that formed in alluvium.

Organic material occurs as deposits of plant residue. After the glaciers withdrew from the area, water remained standing in depressions on outwash plains, flood plains, till plains, and lake plains. Grasses and sedges grew around the edges of these lakes. When these plants died, their residue did not decompose because the areas were wet. Later, water-tolerant trees grew in the areas. After these trees died, their residue became part of the organic accumulation. Eventually, the lakes were filled with organic material and developed into areas of muck. Carbondale and Loxley are examples of soils that formed in organic material.

Plant and Animal Life

Plants, animals, insects, bacteria, and fungi are important in the formation of soils. Additions of organic matter and nitrogen in the soil, gains or losses in plant nutrients, and alterations in soil structure and porosity are among the changes caused by living organisms. In this survey area, vegetation, dominantly hardwood and coniferous trees, has affected soil formation more than the other living organisms.

Climate

Climate determines the kind of plant and animal life on and in the soil and the amount of water available for the weathering of minerals and the translocation of soil material. Through its influence on soil temperature, climate also determines the rate of chemical reaction in the soil.

The climate in Chippewa County is cool and humid. Presumably, it is similar to that under which the soils formed. The climate generally is uniform in all areas, except for those near the shorelines of Lake Superior and Lake Huron. Only minor differences among the soils in the county are the result of differences in climate.

Relief

Relief affects soil formation through its influence on runoff, erosion, drainage, soil temperature, and plant cover. It causes erosional and depositional changes, and thus alters the influence of the parent material and of time *(4)*. It alters the effects of climate through its influence on runoff, the water table, aspect, and vegetation.

Time

Generally, a long time is needed for the development of distinct horizons. The degree of profile development commonly reflects the length of time that the parent material has been in place. Some soils form rapidly; others form slowly.

The soils in Chippewa County range from young to mature. Most of the soils that formed in glacial deposits have been exposed to the soil-forming factors long enough for the development of distinct horizons. Oldman soils are an example. The soils that formed in recent alluvial material have not been in place long enough for distinct horizons to develop. Wega soils are an example.

Processes of Soil Formation

The processes responsible for the development of the soil horizons in the unconsolidated parent material are referred to as soil genesis. The physical, chemical, and biological properties of the horizons are known as soil morphology.

Several processes were involved in the development of horizons in the soils of Chippewa County. These are the accumulation of organic matter, the leaching of lime and other bases, the reduction and transfer of iron, and the formation and translocation of silicate clay minerals. More than one of these processes have helped to differentiate horizons in most of the soils.

As organic matter accumulates at the surface, an A horizon forms. The A and E horizons are mixed into a plow layer, or Ap horizon, if the soil is plowed. The surface layer of the soils in Chippewa County ranges from high to low in organic matter content. The content is high, for example, in Ermatinger soils and low in Deer Park soils.

Carbonates and other bases have been leached from most of the soils. The leaching of bases generally precedes the translocation of silicate clay minerals. Several of the soils are moderately leached or strongly leached. Rubicon soils, for example, are leached of carbonates to a depth of more than 60 inches, and Bowers soils are leached to a depth of 16 inches.

Gleying, or the reduction and transfer of iron, is evident in somewhat poorly drained, poorly drained, and very poorly drained soils. An example is Gutport soils. A gray subsoil indicates the reduction and loss of iron.

The translocation of clay minerals has contributed to horizon development in some soils. An eluviated, or leached, E horizon typically is lower in content of clay and lighter in color than the illuviated B horizon. The B horizon typically has an accumulation of clay, or clay films, in pores and on the faces of peds. These soils were probably leached of carbonates and soluble salts to a considerable extent before the translocation of silicate clay minerals. Emmet soils are an example of soils in which translocated silicate clay minerals in the form of clay films have accumulated in the B horizon.

In some soils in Chippewa County, iron, aluminum, and humus have been transferred from the surface layer to the B horizon. The B horizon in these soils is dark brown. Kalkaska and Sugar soils are examples.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Dense layer. A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, for example, fire, that exposes the surface.

Esker (geology). A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

Excess fines (in tables). Excess silt and clay in the soil. The soil is not a source of gravel or sand for construction purposes.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, or clay.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Glacial drift (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits (geology). Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric and the more decomposed sapric material.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. The major horizons are as follows:

O horizon.—An organic layer of fresh and decaying plant residue.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, any plowed or disturbed surface layer.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is in part a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) granular, prismatic, or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Hard, consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Moraine (geology). An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium,* from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse,* more than 15 millimeters (about 0.6 inch).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it is generally low in relief.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil, adversely affecting the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rippable. Bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called groundwater runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the substratum. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey the following slope classes are recognized:

Nearly level	0 to 3 percent
Nearly level and undulating	2 to 6 percent
Gently rolling	6 to 12 percent
Rolling	12 to 18 percent
Hilly	18 to 25 percent
Steep	25 to 35 percent
Very steep	greater than 35 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow refill (in tables). The slow filling of ponds, resulting from restricted permeability in the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the substratum. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material too thin for the specified use.

Till plain. An extensive flat to undulating area underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Varve. A sedimentary layer of a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1952-80 at Whitefish Point, Michigan, and 1951-80 at Sault Ste. Marie and Dunbar, Michigan)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
WHITEFISH POINT:											
January----	23.8	10.6	17.2	40	-13	0	3.30	2.0	4.4	12	38.5
February---	24.5	7.3	15.9	40	-20	0	3.36	1.3	3.3	7	25.2
March------	33.4	15.6	24.5	50	-12	0	1.87	1.0	2.6	6	15.8
April------	44.2	28.1	36.1	66	7	1	2.08	1.2	2.9	5	3.9
May--------	55.7	36.5	46.1	78	23	40	2.60	1.2	3.9	5	.1
June-------	65.3	44.6	54.9	85	30	172	3.30	2.2	4.4	7	.0
July-------	71.4	50.8	61.1	87	37	353	2.81	1.3	4.1	5	.0
August-----	71.4	53.1	62.2	87	38	389	3.42	2.0	4.6	7	.0
September--	61.5	46.1	53.8	81	31	200	3.28	1.8	4.6	8	.0
October----	51.5	38.1	44.8	73	24	51	2.65	1.5	3.7	7	.7
November---	28.8	27.9	33.3	59	7	0	2.89	1.9	3.8	8	12.4
December---	28.0	16.7	22.4	46	-3	0	3.19	2.0	4.2	11	32.6
Yearly:											
Average---	46.6	31.3	39.3	---	---	---	---	---	---	---	---
Extreme---	---	---	---	90	-21	---	---	---	---	---	---
Total-----	---	---	---	---	---	1,206	34.75	29.4	38.4	89	129.2
SAULT STE. MARIE:											
January----	21.2	5.4	13.3	40	-23	0	2.20	1.4	2.9	8	28.9
February---	23.1	5.3	14.2	41	-24	0	1.69	0.9	2.4	5	20.1
March------	32.1	15.4	23.8	51	-13	0	2.03	1.2	2.8	6	15.6
April------	47.1	29.0	38.1	74	9	12	2.38	1.6	3.1	6	4.9
May--------	61.0	38.3	49.6	85	23	104	2.90	1.7	4.0	6	.6
June-------	70.1	46.6	58.3	88	32	268	3.26	2.0	4.4	7	.0
July-------	75.1	51.9	63.5	91	39	427	3.00	1.8	4.1	6	.0
August-----	73.4	52.4	62.9	90	37	408	3.46	2.0	4.8	7	.0
September--	64.2	45.3	54.7	86	29	182	3.90	2.6	5.1	9	.2
October----	53.6	36.9	45.2	76	21	49	2.89	1.3	4.2	7	2.0
November---	39.0	26.4	32.7	61	1	2	3.20	2.2	4.1	9	14.4
December---	26.6	12.7	19.6	48	-16	0	2.57	1.8	3.3	8	28.0
Yearly:											
Average---	48.9	30.5	39.7	---	---	---	---	---	---	---	---
Extreme---	---	---	---	92	-26	---	---	---	---	---	---
Total-----	---	---	---	---	---	1,452	33.48	29.1	37.6	84	114.7

See footnote at end of table.

TABLE 1.--TEMPERATURE AND PRECIPITATION--Continued

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	^{o}F	^{o}F	^{o}F	^{o}F	^{o}F	Units	In	In	In		In
DUNBAR:											
January----	23.1	4.8	13.9	42	-27	0	1.63	1.0	2.2	6	23.4
February---	25.8	3.7	14.7	44	-29	0	1.39	.7	2.0	5	18.2
March------	35.1	13.9	24.5	54	-21	0	1.89	1.1	2.6	5	14.8
April------	49.2	28.5	38.8	74	4	10	2.40	1.5	3.2	6	4.3
May--------	63.2	38.2	50.7	84	23	112	2.91	1.9	3.8	7	.2
June-------	71.4	47.5	59.4	87	32	295	3.20	1.7	4.5	7	.0
July-------	75.8	53.2	64.5	89	39	457	3.15	1.8	4.3	6	.0
August-----	73.8	53.4	63.6	88	37	429	3.50	2.3	4.6	7	.0
September--	65.0	46.8	55.9	85	29	208	4.09	2.6	5.4	8	.1
October----	55.0	37.7	46.3	76	21	57	2.64	1.3	3.8	7	1.0
November---	40.6	27.2	33.9	61	1	2	2.98	2.0	3.9	8	11.5
December---	28.2	13.2	20.7	49	-19	0	2.16	1.5	2.8	7	25.5
Yearly:											
Average---	50.5	30.7	40.6	---	---	---	---	---	---	---	---
Extreme---	---	---	---	91	-31	---	---	---	---	---	---
Total-----	---	---	---	---	---	1,570	31.94	28.2	35.6	79	99.0

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

(Recorded in the period 1930-79 at Sault Ste. Marie, Michigan, and 1952-78 at Whitefish Point, Michigan)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
SAULT STE. MARIE:			
Last freezing temperature in spring:			
1 year in 10 later than--	May 7	May 21	June 6
2 years in 10 later than--	May 2	May 16	June 1
5 years in 10 later than--	Apr. 22	May 6	May 22
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 12	Sept. 29	Sept. 13
2 years in 10 earlier than--	Oct. 18	Oct. 4	Sept. 18
5 years in 10 earlier than--	Oct. 30	Oct. 15	Sept. 28
WHITEFISH POINT:			
Last freezing temperature in spring:			
1 year in 10 later than--	May 12	May 26	June 12
2 years in 10 later than--	May 7	May 21	June 8
5 years in 10 later than--	Apr. 27	May 12	May 31
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 20	Oct. 3	Sept. 18
2 years in 10 earlier than--	Oct. 26	Oct. 9	Sept. 24
5 years in 10 earlier than--	Nov. 6	Oct. 19	Oct. 6

TABLE 3.--GROWING SEASON

(Recorded in the period 1930-79 at Sault Ste. Marie, Michigan, and 1952-78 at Whitefish Point, Michigan)

Probability	Daily minimum temperature during growing season: Higher than 24 ^{o}F	Higher than 28 ^{o}F	Higher than 32 ^{o}F
	Days	Days	Days
SAULT STE. MARIE:			
9 years in 10	167	137	106
8 years in 10	175	145	114
5 years in 10	190	161	129
2 years in 10	205	176	143
1 year in 10	213	184	151
WHITEFISH POINT:			
9 years in 10	167	137	106
8 years in 10	176	145	114
5 years in 10	193	160	128
2 years in 10	210	175	142
1 year in 10	219	183	150

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
10B	Ontonagon silt loam, 2 to 6 percent slopes	8,280	0.8
10D	Ontonagon silt loam, 6 to 15 percent slopes	1,908	0.2
10F	Ontonagon silt loam, 25 to 50 percent slopes	6,443	0.6
11A	Rudyard silty clay loam, 0 to 3 percent slopes	53,807	5.3
12	Pickford silty clay loam	78,641	7.7
13B	Alcona loamy very fine sand, 0 to 6 percent slopes	5,048	0.5
13D	Alcona loamy very fine sand, 6 to 15 percent slopes	1,705	0.2
13F	Alcona loamy very fine sand, 25 to 50 percent slopes	2,099	0.2
14A	Gaastra silt loam, 0 to 3 percent slopes	3,571	0.4
15B	Rousseau fine sand, dark subsoil, 0 to 6 percent slopes	7,550	0.7
15D	Rousseau fine sand, dark subsoil, 6 to 15 percent slopes	3,033	0.3
15E	Rousseau fine sand, dark subsoil, 15 to 35 percent slopes	1,223	0.1
15F	Rousseau fine sand, dark subsoil, 35 to 60 percent slopes	1,146	0.1
17D	Deer Park fine sand, 0 to 15 percent slopes	20,387	2.0
17F	Deer Park fine sand, 25 to 50 percent slopes	5,625	0.6
18B	Rubicon sand, 0 to 6 percent slopes	51,536	5.1
18D	Rubicon sand, 6 to 15 percent slopes	6,108	0.6
18E	Rubicon sand, 15 to 35 percent slopes	501	*
19B	Kalkaska sand, 0 to 6 percent slopes	50,801	5.1
19D	Kalkaska sand, 6 to 15 percent slopes	10,674	1.0
19E	Kalkaska sand, 15 to 35 percent slopes	931	0.1
19F	Kalkaska sand, 35 to 60 percent slopes	2,541	0.2
20A	Croswell sand, 0 to 3 percent slopes	12,120	1.2
21A	Au Gres sand, 0 to 3 percent slopes	8,050	0.8
22	Kinross muck	8,127	0.8
23	Roscommon muck	6,528	0.6
25B	Guardlake loam, 0 to 6 percent slopes	3,957	0.4
25D	Guardlake loam, 6 to 15 percent slopes	658	0.1
27B	Emmet sandy loam, 1 to 6 percent slopes	1,383	0.1
28B	Longrie sandy loam, 1 to 6 percent slopes	1,874	0.2
29A	Solona fine sandy loam, 0 to 3 percent slopes	994	0.1
32A	Allendale loamy fine sand, 0 to 3 percent slopes	13,081	1.3
33	Pits, sand and gravel	1,475	0.1
34	Entisols, flooded	3,961	0.4
35	Histosols and Aquents, ponded	13,211	1.3
36	Markey and Carbondale mucks	110,637	10.9
37	Dawson and Loxley peats	28,052	2.9
38F	Deer Park-Kinross complex, 0 to 50 percent slopes	15,584	1.5
39D	Au Gres-Dawson-Rubicon complex, 0 to 15 percent slopes	8,964	0.9
40A	Rudyard-Allendale complex, 0 to 3 percent slopes	1,253	0.1
41D	Summerville-Rock outcrop complex, 1 to 15 percent slopes	6,419	0.6
41F	Summerville-Rock outcrop complex, 15 to 45 percent slopes	712	0.1
42D	Emmet-Kalkaska complex, 1 to 15 percent slopes	641	0.1
44B	Posen stony fine sandy loam, 1 to 6 percent slopes	15,988	1.6
44D	Posen stony fine sandy loam, 6 to 15 percent slopes	4,142	0.4
44E	Posen stony fine sandy loam, 15 to 35 percent slopes	1,379	0.1
46B	Pence loamy sand, 0 to 6 percent slopes	11,376	1.1
46D	Pence loamy sand, 6 to 15 percent slopes	1,466	0.1
46E	Pence loamy sand, 15 to 35 percent slopes	955	0.1
48E	Wainola-Kinross-Rousseau complex, 0 to 35 percent slopes	15,864	1.6
49A	Wainola fine sand, 0 to 3 percent slopes	4,572	0.4
50	Deford fine sand	4,122	0.4
52A	Ingalls loamy sand, 0 to 3 percent slopes	4,992	0.5
53B	Menominee loamy sand, 0 to 6 percent slopes	1,504	0.1
56A	Ensign silt loam, 0 to 3 percent slopes, rocky	6,217	0.6
57B	Summerville-Longrie complex, 1 to 6 percent slopes, rocky	3,550	0.3
61A	Halfaday sand, 0 to 3 percent slopes	7,279	0.7
67B	Duel-Rock outcrop complex, 1 to 6 percent slopes	1,284	0.1
68	Pinconning mucky loamy sand	6,903	0.7
78B	Waiska sandy loam, 0 to 6 percent slopes	1,219	0.1
79B	Kalkaska-Manistee sands, 0 to 6 percent slopes	4,473	0.4
79D	Kalkaska-Manistee sands, 6 to 15 percent slopes	1,408	0.1
80B	Superior fine sandy loam, 1 to 6 percent slopes	1,655	0.2

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
83A	Allendale-Croswell complex, 0 to 3 percent slopes	518	0.1
84B	Rousseau, dark subsoil-Alcona complex, 0 to 6 percent slopes	5,096	0.5
84D	Rousseau, dark subsoil-Alcona complex, 6 to 15 percent slopes	936	0.1
84F	Rousseau, dark subsoil-Alcona complex, 25 to 50 percent slopes	481	*
85B	Kalkaska-Ocqueoc complex, 0 to 6 percent slopes	6,206	0.6
86A	Ingalls-Halfaday complex, 0 to 3 percent slopes	765	0.1
87B	Rousseau fine sand, moderately wet, 0 to 6 percent slopes	6,526	0.6
88A	Croswell-Au Gres sands, 0 to 3 percent slopes	10,794	1.1
89A	Kinross-Au Gres complex, 0 to 3 percent slopes	16,927	1.8
91B	Rousseau fine sand, 0 to 6 percent slopes	1,194	0.1
91D	Rousseau fine sand, 6 to 15 percent slopes	828	0.1
91E	Rousseau fine sand, 15 to 35 percent slopes	950	0.1
92A	Biscuit very fine sandy loam, 0 to 3 percent slopes	8,029	0.8
93F	Ontonagon-Pickford complex, 0 to 50 percent slopes	7,529	0.7
94A	Markey-Kinross-Au Gres complex, 0 to 3 percent slopes	20,444	2.0
95A	Bowers silt loam, 0 to 3 percent slopes	7,311	0.7
96B	Velvet-Westbury complex, 0 to 6 percent slopes	1,279	0.1
97A	Wega very fine sandy loam, 0 to 3 percent slopes	4,643	0.5
98	Ermatinger silt loam	12,569	1.2
99A	Westbury stony fine sandy loam, 0 to 3 percent slopes	752	0.1
101	Chippeny muck	905	0.1
102	Kinross-Dawson complex	5,201	0.5
103D	Velvet-Rockbottom complex, 6 to 15 percent slopes	2,005	0.2
103E	Velvet-Rockbottom complex, 15 to 35 percent slopes	274	*
104B	Amasa very fine sandy loam, 0 to 6 percent slopes	3,387	0.3
104D	Amasa very fine sandy loam, 6 to 15 percent slopes	198	*
104F	Amasa very fine sandy loam, 25 to 50 percent slopes	116	*
106A	Potagannissing-Rock outcrop complex, 0 to 3 percent slopes	5,904	0.6
107B	Oldman stony fine sandy loam, 2 to 6 percent slopes	4,825	0.5
108D	Shelter-Alpena complex, 0 to 15 percent slopes	5,709	0.6
111	Gutport muck	513	0.1
112	Soo silty clay loam	14,351	1.4
113	Ruse mucky fine sandy loam	1,021	0.1
114B	Velvet very stony loamy sand, 0 to 6 percent slopes	1,651	0.2
114D	Velvet very stony loamy sand, 6 to 15 percent slopes	561	0.1
116	Udorthents, nearly level	788	0.1
117B	Manistee sand, 0 to 6 percent slopes	1,266	0.1
117D	Manistee sand, 6 to 15 percent slopes	175	*
117F	Manistee sand, 25 to 50 percent slopes	294	*
119	Gogomain very fine sandy loam	19,834	1.9
121B	Rockbottom stony silt loam, 2 to 6 percent slopes	519	0.1
122	Pits, quarry	695	0.1
123B	Ocqueoc fine sand, 0 to 6 percent slopes	2,719	0.3
124D	Alpena very cobbly sandy loam, 0 to 15 percent slopes	1,477	0.1
125B	Croswell-Markey complex, 0 to 6 percent slopes	1,320	0.1
126	Pickford silt loam	17,841	1.8
127	Gay stony muck	836	0.1
128F	Alcona-Markey complex, 0 to 50 percent slopes	2,872	0.3
129A	Rudyard silt loam, 0 to 3 percent slopes	9,658	0.9
130A	Rudyard-Pickford silty clay loams, 0 to 3 percent slopes	6,327	0.6
132B	Sugar very fine sandy loam, 0 to 6 percent slopes	3,210	0.3
132F	Sugar very fine sandy loam, 25 to 50 percent slopes	2,039	0.2
133	Dora muck	7,881	0.8
135B	Longrie-Posen complex, 0 to 6 percent slopes	3,744	0.4
136A	Westbury-Gay complex, 0 to 3 percent slopes	5,442	0.5
137A	Kinross-Wainola complex, 0 to 3 percent slopes	9,530	0.9
138B	Rousseau, dark subsoil-Urban land complex, 0 to 4 percent slopes	2,050	0.2
139A	Rudyard-Urban land complex, 0 to 3 percent slopes	1,317	0.1
143	Burleigh loamy fine sand	9,213	0.9
144	Urban land-Udorthents complex, nearly level	2,935	0.3
145A	Gaastra-Gogomain-Ingalls complex, 0 to 3 percent slopes	9,178	0.9
146A	Allendale-Fibre complex, 0 to 3 percent slopes	4,667	0.5
147B	Shelter very stony loam, 0 to 6 percent slopes	30,198	3.0

See footnote at end of table.

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
147D	Shelter very stony loam, 6 to 15 percent slopes	3,483	0.3
148B	Longrie-Rock outcrop complex, 1 to 6 percent slopes	1,770	0.2
149B	Kalkaska sand, 0 to 6 percent slopes, stony	3,922	0.4
150	Fibre muck	3,164	0.3
151	Beavertail muck	3,374	0.3
152	Grousehaven muck	258	*
153	Dumps, limestone	110	*
154F	Dawson-Deer Park-Wainola complex, 0 to 50 percent slopes	2,627	0.3
155B	Allendale-Posen-Pickford complex, 0 to 6 percent slopes	2,346	0.2
156A	Rockcut-Pinconning complex, 0 to 3 percent slopes	1,264	0.1
159B	Amasa-Sugar very fine sandy loams, 0 to 6 percent slopes	1,276	0.1
159F	Amasa-Sugar very fine sandy loams, 25 to 50 percent slopes	385	*
	Water areas less than 40 acres in size	3,739	0.4
	Total	1,017,728	100.0

* Less than 0.1 percent.

TABLE 5.--PRIME FARMLAND

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name)

Map symbol	Soil name
13B	Alcona loamy very fine sand, 0 to 6 percent slopes
14A	Gaastra silt loam, 0 to 3 percent slopes (where drained)
27B	Emmet sandy loam, 1 to 6 percent slopes
29A	Solona fine sandy loam, 0 to 3 percent slopes (where drained)
52A	Ingalls loamy sand, 0 to 3 percent slopes (where drained)
95A	Bowers silt loam, 0 to 3 percent slopes (where drained)
97A	Wega very fine sandy loam, 0 to 3 percent slopes (where drained)
98	Ermatinger silt loam (where drained)
104B	Amasa very fine sandy loam, 0 to 6 percent slopes
112	Soo silty clay loam (where drained)
119	Gogomain very fine sandy loam (where drained)
132B	Sugar very fine sandy loam, 0 to 6 percent slopes
145A	Gaastra-Gogomain-Ingalls complex, 0 to 3 percent slopes (where drained)

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Barley	Oats	Winter wheat	Trefoil-grass hay
		Bu	Bu	Bu	Tons
10B Ontonagon	IIIe	60	60	50	3.5
10D Ontonagon	IIIe	60	60	50	3.5
10F Ontonagon	VIIe	---	---	---	---
11A Rudyard	IIIw	60	60	50	3.0
12 Pickford	IIIw	55	60	45	2.5
13B Alcona	IIe	60	60	50	3.5
13D Alcona	IIIe	---	---	---	---
13F Alcona	VIIe	---	---	---	---
14A Gaastra	IIw	60	65	50	3.5
15B Rousseau	IIIs	40	45	35	1.5
15D Rousseau	IIIe	---	---	---	---
15E, 15F Rousseau	VIe	---	---	---	---
17D, 17F Deer Park	VIIs	---	---	---	---
18B, 18D Rubicon	VIs	---	---	---	---
18E Rubicon	VIIs	---	---	---	---
19B Kalkaska	IVs	---	40	35	1.5
19D Kalkaska	VIs	---	---	---	---
19E, 19F Kalkaska	VIIs	---	---	---	---
20A Croswell	IVs	---	40	35	2.0
21A Au Gres	IVw	---	40	35	2.0

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Land capability	Barley	Oats	Winter wheat	Trefoil-grass hay
		Bu	Bu	Bu	Tons
22------------------------ Kinross	VIw	---	---	---	---
23------------------------ Roscommon	VIw	---	---	---	---
25B, 25D------------------ Guardlake	IIIs	---	60	---	2.0
27B----------------------- Emmet	IIe	60	60	50	3.5
28B----------------------- Longrie	IIe	55	55	45	2.5
29A----------------------- Solona	IIw	60	60	50	2.5
32A----------------------- Allendale	IIIw	50	60	40	2.0
33*. Pits					
34. Entisols					
35. Histosols and Aquents					
36------------------------ Markey and Carbondale	VIw	---	---	---	---
37------------------------ Dawson and Loxley	VIIw	---	---	---	---
38F----------------------- Deer Park-Kinross	VIIs	---	---	---	---
39D----------------------- Au Gres-Dawson-Rubicon	IVw	---	---	---	---
40A----------------------- Rudyard-Allendale	IIIw	50	50	40	2.5
41D*---------------------- Summerville-Rock outcrop	IVe	---	---	---	---
41F*---------------------- Summerville-Rock outcrop	VIIe	---	---	---	---
42D----------------------- Emmet-Kalkaska	IIIe	---	---	---	---
44B----------------------- Posen	IIIs	---	---	---	---
44D----------------------- Posen	VIs	---	---	---	---

See footnote at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Land capability	Barley	Oats	Winter wheat	Trefoil-grass hay
		Bu	Bu	Bu	Tons
44E Posen	VIIs	---	---	---	---
46B Pence	IIIe	45	45	35	1.5
46D Pence	IVe	---	---	---	---
46E Pence	VIIe	---	---	---	---
48E Wainola-Kinross-Rousseau	IIIw	---	---	---	---
49A Wainola	IIIw	45	45	35	2.0
50 Deford	Vw	---	---	---	---
52A Ingalls	IIIw	55	55	40	2.0
53B Menominee	IIIs	55	55	45	3.0
56A Ensign	VIIw	---	---	---	---
57B Summerville-Longrie	IIIs	---	---	---	---
61A Halfaday	IIIs	40	40	35	2.0
67B* Duel-Rock outcrop	IVs	---	---	---	---
68 Pinconning	Vw	---	---	---	---
78B Waiska	VIs	---	---	---	---
79B Kalkaska-Manistee	IVs	45	45	35	2.0
79D Kalkaska-Manistee	VIs	---	---	---	---
80B Superior	IIe	60	60	50	3.5
83A Allendale-Croswell	IIIw	45	45	33	2.0
84B Rousseau-Alcona	IIIs	50	52	40	2.0

See footnote at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Land capability	Barley	Oats	Winter wheat	Trefoil-grass hay
		Bu	Bu	Bu	Tons
84D Rousseau-Alcona	IIIe	---	---	---	---
84F Rousseau-Alcona	VIe	---	---	---	---
85B Kalkaska-Ocqueoc	IVs	48	50	35	2.0
86A Ingalls-Halfaday	IIIw	45	45	35	2.0
87B Rousseau	IIIs	45	45	35	2.0
88A Croswell-Au Gres	IVs	45	45	35	2.0
89A Kinross-Au Gres	VIw	---	---	---	---
91B Rousseau	IIIs	45	45	35	1.5
91D Rousseau	IIIe	---	---	---	---
91E Rousseau	VIIe	---	---	---	---
92A Biscuit	IIIw	60	60	50	3.5
93F Ontonagon-Pickford	VIIe	---	---	---	---
94A Markey-Kinross-Au Gres	VIw	---	---	---	---
95A Bowers	IIw	60	60	48	3.0
96B Velvet-Westbury	VIs	---	---	---	---
97A Wega	IIw	60	60	50	---
98 Ermatinger	Vw	60	65	50	---
99A Westbury	VIIs	---	---	---	---
101 Chippeny	VIIw	---	---	---	---
102 Kinross-Dawson	VIw	---	---	---	---

See footnote at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Land capability	Barley	Oats	Winter wheat	Trefoil-grass hay
		Bu	Bu	Bu	Tons
103D, 103E Velvet-Rockbottom	VIs	---	---	---	---
104B Amasa	IIe	50	50	40	3.0
104D Amasa	IIIe	---	---	---	---
104F Amasa	VIIe	---	---	---	---
106A* Potagannissing-Rock outcrop	VIIs	---	---	---	---
107B Oldman	VIs	---	---	---	---
108D Shelter-Alpena	VIw	---	---	---	---
111 Gutport	VIIw	---	---	---	---
112 Soo	IIw	60	40	50	2.5
113 Ruse	VIIw	---	---	---	---
114B, 114D Velvet	VIs	---	---	---	---
116*. Udorthents					
117B Manistee	IIIs	50	50	40	2.5
117D Manistee	IIIe	---	---	---	---
117F Manistee	VIIe	---	---	---	---
119 Gogomain	Vw	---	---	---	---
121B Rockbottom	VIs	---	---	---	---
122*. Pits					
123B Ocqueoc	IIIs	---	---	---	---
124D Alpena	VIs	---	---	---	---

See footnote at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Land capability	Barley	Oats	Winter wheat	Trefoil-grass hay
		Bu	Bu	Bu	Tons
125B---------------------- Croswell-Markey	IVs	---	---	---	---
126----------------------- Pickford	IIIw	60	60	45	2.5
127----------------------- Gay	Vw	---	---	---	---
128F---------------------- Alcona-Markey	VIIe	---	---	---	---
129A---------------------- Rudyard	IIIw	60	60	50	3.0
130A---------------------- Rudyard-Pickford	IIIw	55	55	40	2.5
132B---------------------- Sugar	IIe	50	60	40	3.0
132F---------------------- Sugar	VIIe	---	---	---	---
133----------------------- Dora	VIw	---	---	---	---
135B---------------------- Longrie-Posen	IIe	---	---	---	---
136A---------------------- Westbury-Gay	VIIs	---	---	---	---
137A---------------------- Kinross-Wainola	VIw	---	---	---	---
138B*. Rousseau-Urban land					
139A*. Rudyard-Urban land					
143----------------------- Burleigh	Vw	---	---	---	---
144*. Urban land-Udorthents					
145A---------------------- Gaastra-Gogomain-Ingalls	IIw	---	---	---	---
146A---------------------- Allendale-Fibre	IIIw	---	---	---	---
147B, 147D---------------- Shelter	VIw	---	---	---	---
148B*--------------------- Longrie-Rock outcrop	IIe	---	---	---	---

See footnote at end of table.

TABLE 6.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS--Continued

Soil name and map symbol	Land capability	Barley	Oats	Winter wheat	Trefoil-grass hay
		Bu	Bu	Bu	Tons
149B Kalkaska	VIs	45	45	35	2.0
150 Fibre	Vw	---	---	---	---
151 Beavertail	Vw	---	---	---	---
152 Grousehaven	VIIw	---	---	---	---
153*. Dumps					
154F Dawson-Deer Park-Wainola	VIIw	---	---	---	---
155B Allendale-Posen-Pickford	IIIw	---	---	---	---
156A Rockcut-Pinconning	VIs	---	---	---	---
159B Amasa-Sugar	IIe	50	55	40	3.0
159F Amasa-Sugar	VIIe	---	---	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--CAPABILITY CLASSES AND SUBCLASSES

(Miscellaneous areas are excluded. Absence of an entry indicates no acreage)

Class	Total acreage	Major management concerns (Subclass)		
		Erosion (e)	Wetness (w)	Soil problem (s)
		Acres	Acres	Acres
I	---	---	---	---
II	63,395	23,347	40,048	---
III	308,741	29,080	222,361	57,300
IV	116,012	7,858	17,014	91,140
V	60,015	---	60,015	---
VI	316,609	2,850	225,037	88,722
VII	123,463	24,779	39,638	59,046
VIII	---	---	---	---

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY

(Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available)

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
10B, 10D Ontonagon	2C	Slight	Severe	Slight	Moderate	Red maple	55	35	White spruce, eastern white pine, northern whitecedar.
						Eastern white pine	44	72	
						Yellow birch	---	---	
						Northern whitecedar	---	---	
						Eastern hemlock	---	---	
						White spruce	---	---	
						Balsam fir	---	---	
						Red pine	46	67	
10F Ontonagon	2R	Severe	Severe	Slight	Moderate	Red maple	55	35	White spruce, eastern white pine, northern whitecedar.
						Eastern white pine	44	72	
						Yellow birch	---	---	
						Northern whitecedar	---	---	
						Eastern hemlock	---	---	
						White spruce	---	---	
						Balsam fir	---	---	
11A Rudyard	6W	Slight	Severe	Moderate	Severe	White spruce	45	84	White spruce, eastern white pine.
						Balsam fir	45	83	
						Quaking aspen	---	---	
						Northern whitecedar	---	---	
						Eastern hemlock	---	---	
						Black ash	---	---	
						Red maple	---	---	
						American basswood	---	---	
12 Pickford	6W	Slight	Severe	Severe	Severe	White spruce	45	84	White spruce, eastern white pine.
						Balsam fir	45	83	
						Paper birch	---	---	
						Eastern hemlock	---	---	
						Quaking aspen	---	---	
						Northern whitecedar	---	---	
						Black ash	---	---	
13B, 13D Alcona	3L	Slight	Moderate	Slight	Slight	Sugar maple	61	38	White spruce, red pine, eastern white pine.
						Red maple	---	---	
						Yellow birch	---	---	
						American basswood	---	---	
						American beech	---	---	
						Northern red oak	---	---	
						Eastern white pine	---	---	
						Red pine	---	---	
13F Alcona	3R	Moderate	Moderate	Slight	Slight	Sugar maple	61	38	White spruce, red pine, eastern white pine.
						Red maple	---	---	
						Yellow birch	---	---	
						American basswood	---	---	
						American beech	---	---	
						Northern red oak	---	---	
						Eastern white pine	---	---	
						Red pine	---	---	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
14A Gaastra	3W	Slight	Severe	Slight	Moderate	Sugar maple Red maple Quaking aspen White spruce Balsam fir American basswood	61 --- --- --- --- ---	38 --- --- --- --- ---	White spruce, eastern white pine.
15B, 15D Rousseau	3S	Slight	Moderate	Moderate	Slight	Sugar maple Red maple Balsam fir Red pine	60 62 --- 63	38 39 --- 109	Red pine, jack pine, white spruce.
15E Rousseau	3R	Moderate	Moderate	Moderate	Slight	Sugar maple Red maple Balsam fir Red pine	60 62 --- 63	38 39 --- 109	Red pine, jack pine, white spruce.
15F Rousseau	3R	Severe	Severe	Moderate	Slight	Sugar maple Red maple Balsam fir Red pine	60 62 --- 63	38 39 --- 109	Red pine, jack pine, white spruce.
17D Deer Park	4S	Slight	Moderate	Moderate	Slight	Red pine Jack pine Eastern white pine Northern red oak Quaking aspen Paper birch	45 46 --- --- --- ---	85 87 --- --- --- ---	Red pine, jack pine.
17F Deer Park	4R	Moderate	Moderate	Moderate	Slight	Red pine Jack pine Eastern white pine Northern red oak Quaking aspen Paper birch	45 46 --- --- --- ---	85 87 --- --- --- ---	Red pine, jack pine.
18B, 18D Rubicon	4S	Slight	Moderate	Moderate	Slight	Quaking aspen Jack pine Red pine Bigtooth aspen Northern red oak Red maple Paper birch Eastern white pine	60 53 53 66 --- 57 --- 45	64 73 82 5 --- 36 --- 75	Red pine, jack pine.
18E Rubicon	4R	Moderate	Moderate	Moderate	Slight	Quaking aspen Jack pine Red pine Bigtooth aspen Northern red oak Red maple Paper birch Eastern white pine	60 53 53 66 --- 57 --- 45	64 73 82 75 --- 36 --- 75	Red pine, jack pine.

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
19B, 19D Kalkaska	3S	Slight	Moderate	Moderate	Slight	Sugar maple	64	40	Red pine, eastern white pine.
						Quaking aspen	---	---	
						Red pine	---	---	
						Eastern white pine	---	---	
						American beech	---	---	
						Paper birch	---	---	
						Northern red oak	---	---	
						Red maple	63	39	
						Bigtooth aspen	80	90	
						Jack pine	63	91	
19E Kalkaska	3R	Moderate	Moderate	Moderate	Slight	Sugar maple	64	40	Red pine, eastern white pine.
						Quaking aspen	---	---	
						Red pine	---	---	
						Eastern white pine	---	---	
						American beech	---	---	
						Paper birch	---	---	
						Northern red oak	---	---	
						Red maple	63	39	
						Bigtooth aspen	80	90	
						Jack pine	63	91	
19F Kalkaska	3R	Severe	Severe	Moderate	Slight	Sugar maple	64	40	Red pine, eastern white pine.
						Quaking aspen	---	---	
						Red pine	---	---	
						Eastern white pine	---	---	
						American beech	---	---	
						Paper birch	---	---	
						Northern red oak	---	---	
						Red maple	63	39	
						Bigtooth aspen	80	90	
						Jack pine	63	91	
20A Croswell	5S	Slight	Moderate	Moderate	Moderate	Quaking aspen	68	78	Red pine, eastern pine, white spruce.
						Red pine	55	88	
						Jack pine	53	73	
						Northern red oak	---	---	
						Eastern white pine	---	---	
						Bigtooth aspen	---	---	
						Red maple	---	---	
21A Au Gres	6W	Slight	Severe	Moderate	Severe	Quaking aspen	70	81	White spruce, red pine, eastern white pine, Norway spruce.
						Bigtooth aspen	---	---	
						Balsam fir	---	---	
						Paper birch	---	---	
						Yellow birch	---	---	
						Red maple	---	---	
						Eastern hemlock	---	---	
						Eastern white pine	---	---	
						Northern whitecedar	---	---	
22 Kinross	2W	Slight	Severe	Severe	Severe	Quaking aspen	45	32	
						Black spruce	33	44	
						Tamarack	---	---	
						Northern whitecedar	---	---	
						Balsam fir	---	---	
						Red maple	---	---	

See footnote at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
23 Roscommon	6W	Slight	Severe	Severe	Severe	Quaking aspen	74	86	
						Black spruce	---	---	
						Northern whitecedar	---	---	
						Balsam fir	---	---	
						Red maple	---	---	
						Yellow birch	---	---	
25B, 25D Guardlake	3A	Slight	Slight	Slight	Slight	Sugar maple	65	40	Red pine, eastern white pine.
						American basswood	---	---	
						Quaking aspen	---	---	
						Bigtooth aspen	---	---	
						White spruce	---	---	
						Eastern white pine	---	---	
						Balsam fir	---	---	
27B Emmet	3L	Slight	Moderate	Slight	Slight	Sugar maple	66	41	White spruce, red pine, eastern white pine.
						Quaking aspen	---	---	
						Yellow birch	---	---	
						Red pine	---	---	
						American basswood	---	---	
						American beech	---	---	
						Eastern white pine	---	---	
						Northern red oak	74	72	
						Eastern hemlock	---	---	
28B Longrie	2D	Slight	Moderate	Slight	Moderate	Sugar maple	54	34	Eastern white pine, red pine, white spruce.
						Yellow birch	---	---	
						American beech	---	---	
						Quaking aspen	---	---	
						Red pine	---	---	
						American basswood	---	---	
						Black cherry	---	---	
						Balsam fir	---	---	
29A Solona	3W	Slight	Severe	Slight	Moderate	Sugar maple	64	40	Eastern white pine, white spruce.
						Northern red oak	---	---	
						White ash	---	---	
						American basswood	---	---	
32A Allendale	4W	Slight	Severe	Slight	Moderate	Quaking aspen	60	64	White spruce, eastern white pine.
						Eastern white pine	---	---	
						White spruce	---	---	
						Paper birch	---	---	
						Balsam fir	---	---	
						Red maple	---	---	
36**: Markey	2W	Slight	Severe	Severe	Severe	Quaking aspen	45	32	
						Balsam fir	---	---	
						Black spruce	35	46	
						Tamarack	---	---	
						Black ash	---	---	
						Northern whitecedar	---	---	
						Paper birch	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Productivity class*	
36**:									
Carbondale	5W	Slight	Severe	Severe	Severe	Balsam fir	40	71	
						Black spruce	15	23	
						Northern whitecedar	---	---	
						Tamarack	---	---	
						Paper birch	---	---	
						Silver maple	78	32	
37**:									
Dawson	2W	Slight	Severe	Severe	Severe	Black spruce	15	23	
						Tamarack	---	---	
Loxley	2W	Slight	Severe	Severe	Severe	Black spruce	15	23	
						Tamarack	---	---	
						Balsam fir	---	---	
38F**:									
Deer Park	4R	Moderate	Moderate	Moderate	Slight	Red pine	45	85	Red pine, jack pine.
						Jack pine	46	87	
						Eastern white pine	---	---	
						Northern red oak	---	---	
						Quaking aspen	---	---	
						Paper birch	---	---	
Kinross	2W	Slight	Severe	Severe	Severe	Quaking aspen	45	32	
						Black spruce	33	44	
						Tamarack	---	---	
						Northern whitecedar	---	---	
						Balsam fir	---	---	
39D**:									
Au Gres	6W	Slight	Severe	Moderate	Severe	Quaking aspen	70	81	White spruce, red pine, eastern white pine, Norway spruce.
						Bigtooth aspen	---	---	
						Balsam fir	---	---	
						Paper birch	---	---	
						Yellow birch	---	---	
						Red maple	---	---	
						Eastern hemlock	---	---	
						Eastern white pine	---	---	
						Northern whitecedar	---	---	
Dawson	2W	Slight	Severe	Severe	Severe	Black spruce	15	23	
						Tamarack	---	---	
Rubicon	4S	Slight	Moderate	Moderate	Slight	Quaking aspen	60	64	Red pine, jack pine.
						Jack pine	53	73	
						Red pine	53	82	
						Bigtooth aspen	66	75	
						Northern red oak	---	---	
						Red maple	57	36	
						Paper birch	---	---	
						Eastern white pine	45	75	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
40A**:									
Rudyard	6W	Slight	Severe	Moderate	Severe	White spruce	45	84	White spruce, eastern white pine.
						Balsam fir	45	83	
						Quaking aspen	---	---	
						Northern whitecedar	---	---	
						Eastern hemlock	---	---	
						Black ash	---	---	
						Red maple	---	---	
						American basswood	---	---	
Allendale	4W	Slight	Severe	Slight	Moderate	Quaking aspen	60	64	White spruce, eastern white pine.
						Eastern white pine	---	---	
						White spruce	---	---	
						Paper birch	---	---	
						Balsam fir	---	---	
						Red maple	---	---	
41D**:									
Summerville	2D	Slight	Moderate	Moderate	Severe	Sugar maple	50	32	White spruce, eastern white pine, red pine.
						Paper birch	53	53	
						American beech	---	---	
						Quaking aspen	---	---	
						Northern whitecedar	---	---	
						Balsam fir	---	---	
						Red pine	---	---	
						Eastern white pine	---	---	
Rock outcrop.									
41F**:									
Summerville	2R	Moderate	Moderate	Moderate	Severe	Sugar maple	50	32	White spruce, eastern white pine, red pine.
						Paper birch	53	53	
						American beech	---	---	
						Quaking aspen	---	---	
						Northern whitecedar	---	---	
						Balsam fir	---	---	
						Red pine	---	---	
						Eastern white pine	---	---	
Rock outcrop.									
42D**:									
Emmet	3L	Slight	Moderate	Slight	Slight	Sugar maple	66	41	White spruce, red pine, eastern white pine.
						Quaking aspen	---	---	
						Yellow birch	---	---	
						Red pine	---	---	
						American basswood	---	---	
						American beech	---	---	
						Eastern white pine	---	---	
						Northern red oak	74	72	
						Eastern hemlock	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
42D**:									
Kalkaska	3S	Slight	Moderate	Moderate	Slight	Sugar maple	64	40	Red pine, jack pine, eastern white pine.
						Quaking aspen	---	---	
						Red pine	---	---	
						Eastern white pine	---	---	
						American beech	---	---	
						Paper birch	---	---	
						Northern red oak	---	---	
						Red maple	63	39	
						Bigtooth aspen	80	94	
						Jack pine	63	91	
44B, 44D Posen	2X	Slight	Moderate	Slight	Slight	Sugar maple	50	32	White spruce, eastern white pine, red pine.
						Quaking aspen	68	78	
						Balsam fir	---	---	
						Yellow birch	---	---	
						American basswood	---	---	
						American beech	---	---	
						Red pine	---	---	
						Northern red oak	---	---	
44E Posen	2R	Moderate	Moderate	Slight	Slight	Sugar maple	50	32	White spruce, eastern white pine, red pine.
						Quaking aspen	68	78	
						Balsam fir	---	---	
						Yellow birch	---	---	
						American basswood	---	---	
						American beech	---	---	
						Red pine	---	---	
						Northern red oak	---	---	
46B, 46D Pence	3S	Slight	Moderate	Slight	Slight	Sugar maple	59	37	Red pine, eastern white pine, jack pine.
						Red pine	59	99	
						Eastern white pine	57	112	
						Balsam fir	---	---	
						Quaking aspen	---	---	
						Paper birch	---	---	
						Yellow birch	---	---	
46E Pence	3R	Moderate	Moderate	Slight	Slight	Sugar maple	59	37	Red pine, eastern white pine, jack pine.
						Red pine	59	99	
						Eastern white pine	57	112	
						Balsam fir	---	---	
						Quaking aspen	---	---	
						Paper birch	---	---	
						Yellow birch	---	---	
48E**:									
Wainola	6W	Slight	Severe	Moderate	Severe	Quaking aspen	70	81	White spruce, Norway spruce, eastern white pine.
						Red maple	68	42	
						Northern red oak	68	63	
Kinross	2W	Slight	Severe	Severe	Severe	Quaking aspen	45	32	
						Black spruce	32	44	
						Tamarack	---	---	
						Northern whitecedar	---	---	
						Balsam fir	---	---	
						Red maple	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

		Management concerns				Potential productivity			
Soil name and map symbol	Ordination symbol	Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	Trees to plant
48E**:									
Rousseau	5R	Moderate	Moderate	Moderate	Slight	Quaking aspen	65	73	Red pine, jack pine.
						Red maple	60	38	
						Balsam fir	---	---	
						Northern red oak	---	---	
						Eastern hemlock	---	---	
						Red pine	---	---	
						Jack pine	62	89	
						Paper birch	65	93	
						Yellow birch	---	---	
						Bigtooth aspen	60	64	
49A Wainola	6W	Slight	Severe	Moderate	Severe	Quaking aspen	70	81	White spruce, Norway spruce, eastern white pine.
						Red maple	68	42	
						Northern red oak	68	4	
50 Deford	4W	Slight	Severe	Severe	Severe	Quaking aspen	60	64	
						Balsam fir	---	---	
						Northern whitecedar	---	---	
						Red maple	---	---	
52A Ingalls	4W	Slight	Severe	Moderate	Severe	Quaking aspen	60	64	Eastern white pine, white spruce.
						Red maple	---	---	
						Sugar maple	---	---	
						Jack pine	---	---	
						Northern whitecedar	---	---	
						Balsam fir	---	---	
						Paper birch	---	---	
						Red maple	---	---	
						Bigtooth aspen	---	---	
						Eastern hemlock	---	---	
						Yellow birch	---	---	
53B Menominee	6A	Slight	Slight	Slight	Slight	Quaking aspen	74	86	Red pine, white spruce, eastern white pine.
						Sugar maple	---	---	
						Red pine	---	---	
						Paper birch	---	---	
						Yellow birch	---	---	
						American basswood	---	---	
56A Ensign	2W	Slight	Severe	Moderate	Severe	Red maple	53	34	Northern whitecedar, eastern white pine.
						Quaking aspen	---	---	
						Bigtooth aspen	---	---	
						Balsam fir	---	---	
						Northern whitecedar	---	---	
						Red pine	---	---	
						Paper birch	---	---	
57B**:									
Summerville	2D	Slight	Moderate	Moderate	Severe	Sugar maple	50	32	Northern whitecedar, white spruce, eastern white pine.
						Paper birch	53	53	
						American beech	---	---	
						Quaking aspen	---	---	
						Northern whitecedar	---	---	
						Balsam fir	---	---	
						Red pine	---	---	
						Eastern white pine	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
57B**: Longrie--------	2D	Slight	Moderate	Slight	Moderate	Sugar maple---------	54	34	Eastern white pine, red pine, white spruce.
						Yellow birch--------	---	---	
						American beech------	---	---	
						Quaking aspen-------	---	---	
						Red pine------------	---	---	
						American basswood---	---	---	
						Black cherry--------	---	---	
						Balsam fir----------	---	---	
61A------------- Halfaday	3S	Slight	Moderate	Moderate	Slight	Sugar maple---------	62	39	Red pine, eastern white pine, white spruce.
						Red pine------------	---	---	
						Quaking aspen-------	---	---	
						Jack pine-----------	63	91	
						Black cherry--------	---	---	
						Eastern white pine--	---	---	
						Bigtooth aspen------	80	94	
						Red maple-----------	60	38	
						Paper birch---------	---	---	
67B**: Duel-----------	2D	Slight	Moderate	Moderate	Slight	Sugar maple---------	53	34	Red pine, eastern white pine.
						Quaking aspen-------	---	---	
						Balsam fir----------	---	---	
						Paper birch---------	---	---	
						Red maple-----------	---	---	
Rock outcrop.									
68-------------- Pinconning	3W	Slight	Severe	Severe	Severe	Quaking aspen-------	50	43	
						Black ash-----------	---	---	
						Black spruce--------	---	---	
						Northern whitecedar-	---	---	
78B------------- Waiska	3A	Slight	Slight	Slight	Slight	Sugar maple---------	61	38	Red pine, jack pine.
						Eastern hemlock-----	---	---	
						Quaking aspen-------	71	82	
						Paper birch---------	---	---	
						American basswood---	---	---	
						Yellow birch--------	---	---	
						American beech------	---	---	
						Balsam fir----------	---	---	
79B**, 79D**: Kalkaska-------	3S	Slight	Moderate	Moderate	Slight	Sugar maple---------	64	40	Red pine, jack pine, eastern white pine.
						Quaking aspen-------	---	---	
						Red pine------------	---	---	
						Eastern white pine--	---	---	
						American beech------	---	---	
						Paper birch---------	---	---	
						Northern red oak----	---	---	
						Red maple-----------	63	39	
						Bigtooth aspen------	80	94	
						Jack pine-----------	63	6	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
79B**, 79D**:									
Manistee-------	3S	Slight	Moderate	Moderate	Slight	Sugar maple---------	61	40	Red pine, eastern white pine.
						Eastern white pine--	---	---	
						Red maple-----------	---	---	
						Red pine------------	---	---	
						American basswood---	---	---	
						Eastern hemlock-----	---	---	
						Northern red oak----	---	---	
80B------------- Superior	6D	Slight	Severe	Slight	Severe	Red pine------------	54	85	Red pine, eastern white pine, white spruce.
						Northern red oak----	---	---	
						Quaking aspen-------	---	---	
						Paper birch---------	---	---	
						Eastern white pine--	---	---	
						White spruce--------	---	---	
						Sugar maple---------	---	---	
83A**:									
Allendale------	4W	Slight	Severe	Slight	Moderate	Quaking aspen-------	60	64	White spruce, eastern white pine.
						Eastern white pine--	---	---	
						White spruce--------	---	---	
						Paper birch---------	---	---	
						Balsam fir----------	---	---	
						Red maple-----------	---	---	
Croswell-------	5S	Slight	Moderate	Moderate	Moderate	Quaking aspen-------	68	78	Red pine, eastern white pine, white spruce.
						Red pine------------	55	88	
						Jack pine-----------	53	73	
						Northern red oak----	---	---	
						Eastern white pine--	---	---	
						Bigtooth aspen------	---	---	
						Red maple-----------	---	---	
84B**, 84D**:									
Rousseau-------	3S	Slight	Moderate	Moderate	Slight	Sugar maple---------	60	38	Red pine, jack pine, white spruce.
						Red maple-----------	62	39	
						Balsam fir----------	---	---	
						Red pine------------	63	109	
						Jack pine-----------	58	82	
Alcona---------	3L	Slight	Moderate	Slight	Slight	Sugar maple---------	61	38	White spruce, red pine, eastern white pine.
						Red maple-----------	---	---	
						Yellow birch--------	---	---	
						American basswood---	---	---	
						American beech------	---	---	
						Northern red oak----	---	---	
						Eastern white pine--	---	---	
						Red pine------------	---	---	
84F**:									
Rousseau-------	3R	Severe	Severe	Moderate	Slight	Sugar maple---------	60	38	Red pine, jack pine, white spruce.
						Red maple-----------	---	---	
						Balsam fir----------	---	---	
						Red pine------------	63	109	
						Jack pine-----------	58	82	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
84F**:									
Alcona	3R	Severe	Severe	Slight	Slight	Sugar maple	61	38	White spruce, red pine, eastern white pine.
						Red maple	---	---	
						Yellow birch	---	---	
						American basswood	---	---	
						American beech	---	---	
						Northern red oak	---	---	
						Eastern white pine	---	---	
						White ash	---	---	
						Red pine	---	---	
85B**:									
Kalkaska	3S	Slight	Moderate	Moderate	Slight	Sugar maple	64	40	Red pine, jack pine, eastern white pine.
						Quaking aspen	---	---	
						Red pine	---	---	
						Eastern white pine	---	---	
						American beech	---	---	
						Paper birch	---	---	
						Northern red oak	---	---	
						Red maple	63	39	
						Bigtooth aspen	80	94	
						Jack pine	63	91	
Ocqueoc	3S	Slight	Moderate	Slight	Slight	Sugar maple	63	39	Red pine, eastern white pine, white spruce.
						American beech	---	---	
						Yellow birch	---	---	
						Quaking aspen	---	---	
						Eastern white pine	---	---	
						Red pine	---	---	
						Jack pine	---	---	
						Paper birch	---	---	
						Red maple	---	---	
86A**:									
Ingalls	4W	Slight	Severe	Moderate	Severe	Quaking aspen	60	64	Eastern white pine, white spruce.
						White ash	---	---	
						Red maple	---	---	
						Sugar maple	---	---	
						Jack pine	---	---	
						Northern pin oak	---	---	
						Northern whitecedar	---	---	
						Balsam fir	---	---	
						Paper birch	---	---	
						Red maple	---	---	
						Bigtooth aspen	---	---	
						Eastern hemlock	---	---	
						Yellow birch	---	---	
Halfaday	3S	Slight	Moderate	Moderate	Slight	Sugar maple	62	39	Red pine, eastern white pine, white spruce.
						Red pine	---	---	
						Quaking aspen	---	---	
						Jack pine	63	91	
						Black cherry	---	---	
						Eastern white pine	---	---	
						Bigtooth aspen	80	94	
						Red maple	60	38	
						Paper birch	---	---	
87B Rousseau	5S	Slight	Moderate	Moderate	Slight	Quaking aspen	65	73	Red pine, jack pine.

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
88A**:									
Croswell	5S	Slight	Moderate	Moderate	Moderate	Quaking aspen	68	78	Red pine, eastern white pine, white spruce.
						Red pine	55	88	
						Jack pine	53	73	
						Northern red oak	---	---	
						Eastern white pine	---	---	
						Bigtooth aspen	---	---	
						Red maple	---	---	
Au Gres	6W	Slight	Severe	Moderate	Severe	Quaking aspen	70	81	White spruce, red pine, eastern white pine, Norway spruce.
						Bigtooth aspen	---	---	
						Balsam fir	---	---	
						Paper birch	---	---	
						Yellow birch	---	---	
						Red maple	---	---	
						Eastern hemlock	---	---	
						Eastern white pine	---	---	
						Northern whitecedar	---	---	
89A**:									
Kinross	2W	Slight	Severe	Severe	Severe	Quaking aspen	45	32	
						Black spruce	33	44	
						Tamarack	---	---	
						Northern whitecedar	---	---	
						Balsam fir	---	---	
						Red maple	---	---	
Au Gres	6W	Slight	Severe	Moderate	Severe	Quaking aspen	70	81	White spruce, red pine, eastern white pine, Norway spruce.
						Bigtooth aspen	---	---	
						Balsam fir	---	---	
						Paper birch	---	---	
						Yellow birch	---	---	
						Red maple	---	---	
						Eastern hemlock	---	---	
						Eastern white pine	---	---	
						Northern whitecedar	---	---	
91B, 91D Rousseau	5S	Slight	Moderate	Moderate	Slight	Quaking aspen	65	73	Red pine, jack pine.
						Red maple	---	---	
						Balsam fir	---	---	
						Northern red oak	---	---	
						Eastern hemlock	---	---	
						Red pine	---	---	
						Jack pine	62	89	
						Paper birch	65	73	
						Yellow birch	---	---	
						Bigtooth aspen	---	---	
91E Rousseau	5R	Moderate	Moderate	Moderate	Slight	Quaking aspen	65	73	Red pine, jack pine.
						Red maple	---	---	
						Balsam fir	---	---	
						Northern red oak	---	---	
						Eastern hemlock	---	---	
						Red pine	---	---	
						Jack pine	62	89	
						Paper birch	65	73	
						Yellow birch	---	---	
						Bigtooth aspen	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
92A------------- Biscuit	2W	Slight	Severe	Moderate	Severe	Red maple-----------	55	35	White spruce, eastern white pine.
						Balsam fir----------	---	---	
						Quaking aspen-------	54	57	
						White spruce--------	---	---	
						Balsam poplar-------	---	---	
						Paper birch---------	---	---	
93F**: Ontonagon------	2R	Severe	Severe	Slight	Moderate	Red maple-----------	55	35	White spruce, eastern white pine, northern whitecedar.
						Eastern white pine--	44	72	
						Yellow birch--------	---	---	
						Northern whitecedar-	---	---	
						Eastern hemlock-----	---	---	
						White spruce--------	---	---	
						Balsam fir----------	---	---	
Pickford-------	6W	Slight	Severe	Severe	Severe	Balsam fir----------	45	83	
						White spruce--------	45	84	
						Paper birch---------	---	---	
						Eastern hemlock-----	---	---	
						Quaking aspen-------	---	---	
						Northern whitecedar-	---	---	
						Black ash-----------	---	---	
94A**: Markey---------	7W	Slight	Severe	Severe	Severe	Balsam fir----------	52	100	
						Northern whitecedar-	41	61	
						Tamarack------------	---	---	
						White spruce--------	---	---	
						Black spruce--------	35	46	
Kinross--------	2W	Slight	Severe	Severe	Severe	Quaking aspen-------	45	32	
						Black spruce--------	---	---	
						Tamarack------------	---	---	
						Northern whitecedar-	---	---	
						Balsam fir----------	---	---	
						Red maple-----------	---	---	
Au Gres--------	6W	Slight	Severe	Moderate	Severe	Quaking aspen-------	70	81	White spruce, red pine, eastern white pine, Norway spruce.
						Bigtooth aspen------	---	---	
						Balsam fir----------	---	---	
						Paper birch---------	---	---	
						Yellow birch--------	---	---	
						Red maple-----------	---	---	
						Eastern hemlock-----	---	---	
						Eastern white pine--	---	---	
						Northern whitecedar-	---	---	
95A------------- Bowers	7W	Slight	Severe	Slight	Moderate	Balsam fir----------	54	105	White spruce, eastern white pine, Norway spruce.
						American basswood---	---	---	
						Yellow birch--------	---	---	
						Northern red oak----	---	---	
						Quaking aspen-------	---	---	
96B**: Velvet---------	3X	Slight	Severe	Moderate	Severe	Red maple-----------	60	38	
						Sugar maple---------	---	---	
						Quaking aspen-------	---	---	
						Paper birch---------	---	---	
						Balsam fir----------	---	---	
						White spruce--------	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
96B**:									
Westbury	3W	Slight	Moderate	Moderate	Moderate	Northern red oak	60	51	
						Sugar maple	60	38	
						White spruce	56	109	
						Eastern white pine	67	142	
						Red maple	65	40	
						Balsam fir	56	109	
						Eastern hemlock	---	---	
						Northern whitecedar	---	---	
97A Wega	3W	Slight	Severe	Slight	Moderate	Red maple	65	40	Eastern white pine, white spruce, silver maple, white ash.
						Sugar maple	---	---	
						Northern red oak	---	---	
						American basswood	---	---	
						American beech	---	---	
98 Ermatinger	2W	Slight	Severe	Severe	Severe	Red maple	50	32	
						Quaking aspen	---	---	
						White spruce	---	---	
						Black ash	---	---	
						Balsam fir	---	---	
						Balsam poplar	---	---	
						Paper birch	---	---	
99A Westbury	3W	Slight	Moderate	Moderate	Moderate	Northern red oak	60	51	
						Sugar maple	60	38	
						White spruce	56	109	
						Eastern white pine	67	142	
						Red maple	65	40	
						Balsam fir	56	109	
						Eastern hemlock	---	---	
						Northern whitecedar	---	---	
101 Chippeny	4W	Slight	Severe	Severe	Severe	Balsam fir	35	60	
						Black ash	---	---	
						Paper birch	---	---	
						Northern whitecedar	35	51	
						Yellow birch	---	---	
						Red maple	---	---	
						Black spruce	---	---	
						Eastern hemlock	---	---	
						Quaking aspen	---	---	
102**:									
Kinross	2W	Slight	Severe	Severe	Severe	Quaking aspen	45	32	
						Black spruce	33	46	
						Tamarack	---	---	
						Northern whitecedar	---	---	
						Balsam fir	---	---	
Dawson	2W	Slight	Severe	Severe	Severe	Black spruce	15	23	
						Tamarack	---	---	
103D**:									
Velvet	3X	Slight	Severe	Moderate	Severe	Red maple	60	38	
						Sugar maple	---	---	
						Quaking aspen	---	---	
						Paper birch	---	---	
						Balsam fir	---	---	
						White spruce	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
103D**:									
Rockbottom-----	3X	Slight	Moderate	Slight	Moderate	Quaking aspen-------	66	75	
						Red maple-----------	---	---	
						Balsam fir----------	---	---	
						Paper birch---------	---	---	
						Sugar maple---------	---	---	
						White spruce--------	---	---	
						Yellow birch--------	---	---	
103E**:									
Velvet---------	3R	Moderate	Severe	Moderate	Severe	Red maple-----------	60	38	
						Sugar maple---------	---	---	
						Quaking aspen-------	---	---	
						Paper birch---------	---	---	
						Balsam fir----------	---	---	
						White spruce--------	---	---	
Rockbottom-----	3R	Moderate	Moderate	Slight	Slight	Quaking aspen-------	66	75	
						Red maple-----------	---	---	
						Balsam fir----------	---	---	
						Paper birch---------	---	---	
						Sugar maple---------	---	---	
						White spruce--------	---	---	
						Yellow birch--------	---	---	
104B, 104D------ Amasa	3L	Slight	Moderate	Slight	Slight	Sugar maple---------	61	38	White spruce, red pine.
						Quaking aspen-------	65	73	
						Yellow birch--------	---	---	
						Eastern hemlock-----	---	---	
						Balsam fir----------	---	---	
						Red maple-----------	---	---	
						Bigtooth aspen------	---	---	
						Black cherry--------	---	---	
104F------------ Amasa	3R	Severe	Severe	Slight	Slight	Sugar maple---------	61	38	White spruce, red pine.
						Quaking aspen-------	65	73	
						Yellow birch--------	---	---	
						Eastern hemlock-----	---	---	
						Balsam fir----------	---	---	
						Red maple-----------	---	---	
						Bigtooth aspen------	---	---	
106A**:									
Potagannissing-	3W	Slight	Severe	Severe	Severe	Northern whitecedar-	32	46	
						Balsam fir----------	40	71	
						Eastern white pine--	---	---	
						Quaking aspen-------	---	---	
						Red pine------------	---	---	
						White spruce--------	---	---	
						Paper birch---------	---	---	
Rock outcrop.									
107B------------ Oldman	3X	Slight	Moderate	Moderate	Moderate	Sugar maple---------	64	40	
						White ash-----------	65	59	
						Red maple-----------	---	---	
						Northern red oak----	64	57	
						Yellow birch--------	---	---	
						Quaking aspen-------	---	---	
						American basswood---	---	---	
						Balsam fir----------	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
108D**:									
Shelter	4X	Slight	Severe	Moderate	Severe	Balsam fir	34	58	
						White spruce	---	---	
						Northern whitecedar	27	39	
						Quaking aspen	50	43	
						Paper birch	---	---	
						Balsam poplar	---	---	
						Red maple	---	---	
Alpena	3F	Slight	Moderate	Moderate	Slight	Sugar maple	61	38	Red pine.
						Balsam fir	---	---	
						Quaking aspen	---	---	
						Paper birch	---	---	
						White spruce	---	---	
						Northern whitecedar	---	---	
						Yellow birch	---	---	
111	3W	Slight	Severe	Severe	Severe	Northern whitecedar	30	42	
Gutport						Black ash	---	---	
						Balsam poplar	---	---	
						Balsam fir	---	---	
						Quaking aspen	---	---	
112	6W	Slight	Severe	Severe	Severe	White spruce	45	84	
Soo						Balsam fir	45	83	
						Paper birch	---	---	
						Quaking aspen	---	---	
						Red maple	---	---	
113	5W	Slight	Severe	Severe	Severe	Balsam fir	40	71	
Ruse						Black spruce	---	---	
						Northern whitecedar	---	---	
						Black ash	---	---	
						Paper birch	---	---	
						Quaking aspen	---	---	
114B, 114D	3X	Slight	Severe	Moderate	Severe	Red maple	60	38	
Velvet						Sugar maple	---	---	
						Quaking aspen	---	---	
						Paper birch	---	---	
						Balsam fir	---	---	
						White spruce	---	---	
117B, 117D	3S	Slight	Moderate	Moderate	Slight	Sugar maple	61	38	Red pine, eastern white pine.
Manistee						Eastern white pine	---	---	
						Red maple	---	---	
						Red pine	---	---	
						American basswood	---	---	
						Eastern hemlock	---	---	
						Northern red oak	---	---	
117F	3R	Severe	Severe	Moderate	Slight	Sugar maple	61	38	Red pine, eastern white pine.
Manistee						Eastern white pine	---	---	
						Red maple	---	---	
						Red pine	---	---	
						American basswood	---	---	
						Eastern hemlock	---	---	
						Northern red oak	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
119------------- Gogomain	4W	Slight	Severe	Severe	Severe	Quaking aspen-------	55	53	
						Balsam fir----------	---	---	
						Northern whitecedar-	---	---	
						Tamarack------------	---	---	
						Paper birch---------	---	---	
						Balsam poplar-------	---	---	
121B------------ Rockbottom	3X	Slight	Moderate	Slight	Moderate	Quaking aspen-------	66	75	
						Red maple-----------	---	---	
						Balsam fir----------	---	---	
						Paper birch---------	---	---	
						Sugar maple---------	---	---	
						White spruce--------	---	---	
						Yellow birch--------	---	---	
123B------------ Ocqueoc	3S	Slight	Moderate	Slight	Slight	Sugar maple---------	63	39	Red pine, eastern white pine, white spruce.
						American beech------	---	---	
						Yellow birch--------	---	---	
						Quaking aspen-------	---	---	
						Eastern white pine--	---	---	
						Red pine------------	---	---	
						Jack pine-----------	---	---	
						Paper birch---------	---	---	
						Red maple-----------	---	---	
124D------------ Alpena	3F	Slight	Moderate	Moderate	Slight	Sugar maple---------	61	38	Red pine.
						Balsam fir----------	---	---	
						Quaking aspen-------	---	---	
						Paper birch---------	---	---	
						White spruce--------	---	---	
						Northern whitecedar-	---	---	
						Yellow birch--------	---	---	
125B**:									
Croswell-------	5S	Slight	Moderate	Moderate	Moderate	Quaking aspen-------	68	78	Red pine, eastern white pine, white spruce.
						Red pine------------	55	88	
						Jack pine-----------	53	73	
						Northern red oak----	---	---	
						Eastern white pine--	---	---	
						Bigtooth aspen------	---	---	
						Red maple-----------	---	---	
Markey---------	2W	Slight	Severe	Severe	Severe	Quaking aspen-------	45	32	
						Balsam fir----------	---	---	
						Black spruce--------	35	46	
						Tamarack------------	---	---	
						Black ash-----------	---	---	
						Northern whitecedar-	---	---	
						Paper birch---------	---	---	
126------------- Pickford	6W	Slight	Severe	Severe	Severe	White spruce--------	45	84	White spruce, eastern white pine.
						Balsam fir----------	45	83	
						Paper birch---------	---	---	
						Eastern hemlock-----	---	---	
						Quaking aspen-------	---	---	
						Northern whitecedar-	---	---	
						Black ash-----------	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
127 Gay	3W	Slight	Severe	Severe	Severe	Red maple	62	39	
						Balsam fir	53	102	
						White spruce	---	---	
						Eastern hemlock	---	---	
						Yellow birch	---	---	
						Northern whitecedar	---	---	
						Quaking aspen	---	---	
						Paper birch	---	---	
						Black spruce	---	---	
						Tamarack	---	---	
128F**:									
Alcona	3R	Severe	Severe	Slight	Slight	Sugar maple	61	38	White spruce, red pine, eastern white pine.
						Red maple	---	---	
						Yellow birch	---	---	
						American basswood	---	---	
						American beech	---	---	
						Northern red oak	---	---	
						Eastern white pine	---	---	
						Red pine	---	---	
Markey	2W	Slight	Severe	Severe	Severe	Quaking aspen	45	32	
						Balsam fir	---	---	
						Black spruce	35	46	
						Tamarack	---	---	
						Black ash	---	---	
						Northern whitecedar	---	---	
						Paper birch	---	---	
129A Rudyard	6W	Slight	Severe	Moderate	Severe	White spruce	45	84	White spruce, eastern white pine.
						Balsam fir	45	83	
						Quaking aspen	---	---	
						Northern whitecedar	---	---	
						Eastern hemlock	---	---	
						Black ash	---	---	
						Red maple	---	---	
						American basswood	---	---	
130A**:									
Rudyard	6W	Slight	Severe	Moderate	Severe	White spruce	45	84	White spruce, eastern white pine.
						Balsam fir	45	83	
						Quaking aspen	---	---	
						Northern whitecedar	---	---	
						Eastern hemlock	---	---	
						Black ash	---	---	
						Red maple	---	---	
						American basswood	---	---	
Pickford	6W	Slight	Severe	Severe	Severe	White spruce	45	84	White spruce, eastern white pine.
						Balsam fir	45	83	
						Paper birch	---	---	
						Eastern hemlock	---	---	
						Quaking aspen	---	---	
						Northern whitecedar	---	---	
						Black ash	---	---	
132B Sugar	3L	Slight	Severe	Slight	Moderate	Sugar maple	62	39	Red pine, eastern white pine.
						Quaking aspen	---	---	
						Eastern white pine	---	---	
						Paper birch	---	---	
						Red maple	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
132F------------	3R	Severe	Severe	Slight	Slight	Sugar maple---------	62	39	Red pine, eastern white pine.
Sugar						Quaking aspen-------	---	---	
						White spruce--------	---	---	
						Paper birch---------	---	---	
						Red maple-----------	---	---	
133-------------	3W	Slight	Severe	Severe	Severe	Black spruce--------	35	46	Black spruce, tamarack, northern whitecedar, balsam fir.
Dora						Northern whitecedar-	30	42	
						Tamarack------------	45	35	
						Balsam fir----------	50	96	
						Black ash-----------	50	32	
135B**:									
Longrie--------	2D	Slight	Moderate	Slight	Moderate	Sugar maple---------	54	34	Eastern white pine, red pine, white spruce.
						Yellow birch--------	---	---	
						American beech------	---	---	
						Quaking aspen-------	---	---	
						Red pine------------	---	---	
						American basswood---	---	---	
						Balsam fir----------	---	---	
Posen----------	2X	Slight	Moderate	Slight	Slight	Sugar maple---------	50	32	White spruce, eastern white pine, red pine.
						Quaking aspen-------	68	78	
						Balsam fir----------	---	---	
						Yellow birch--------	---	---	
						American basswood---	---	---	
						American beech------	---	---	
						Red pine------------	---	---	
						Northern red oak----	---	---	
136A**:									
Westbury-------	3W	Slight	Moderate	Moderate	Moderate	Northern red oak----	60	51	
						Sugar maple---------	60	38	
						White spruce--------	56	109	
						Eastern white pine--	67	142	
						Red maple-----------	65	40	
						Baslam fir----------	56	109	
						Eastern hemlock-----	---	---	
						Northern whitecedar-	---	---	
Gay------------	6W	Slight	Severe	Severe	Severe	Red maple-----------	62	39	
						Balsam fir----------	53	102	
						White spruce--------	---	---	
						Eastern hemlock-----	---	---	
						Yellow birch--------	---	---	
						Northern whitecedar-	---	---	
						Quaking aspen-------	---	---	
						Paper birch---------	---	---	
						Black spruce--------	---	---	
						Tamarack------------	---	---	
137A**:									
Kinross--------	2W	Slight	Severe	Severe	Severe	Quaking aspen-------	45	32	
						Black spruce--------	33	44	
						Tamarack------------	---	---	
						Northern whitecedar-	---	---	
						Balsam fir----------	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
137A**:									
Wainola--------	6W	Slight	Severe	Moderate	Severe	Quaking aspen-------	70	81	White spruce, Norway spruce, eastern white pine.
						Red maple-----------	68	42	
						Northern red oak----	68	4	
143------------- Burleigh	2W	Slight	Severe	Severe	Severe	Quaking aspen-------	40	22	
						Bigtooth aspen------	---	---	
						Black ash-----------	---	---	
						Red maple-----------	---	---	
145A**:									
Gaastra--------	3W	Slight	Severe	Slight	Moderate	Sugar maple---------	61	38	White spruce, eastern white pine.
						Red maple-----------	---	---	
						Quaking aspen-------	---	---	
						White spruce--------	---	---	
						Balsam fir----------	---	---	
						American basswood---	---	---	
Gogomain-------	4W	Slight	Severe	Severe	Severe	Quaking aspen-------	55	53	
						Balsam fir----------	---	---	
						Northern whitecedar-	---	---	
						Tamarack------------	---	---	
						Paper birch---------	---	---	
						Balsam poplar-------	---	---	
Ingalls--------	4W	Slight	Severe	Moderate	Severe	Quaking aspen-------	60	64	Eastern white pine, white spruce.
						Red maple-----------	---	---	
						Sugar maple---------	---	---	
						Jack pine-----------	---	---	
						Northern whitecedar-	---	---	
						Balsam fir----------	---	---	
						Paper birch---------	---	---	
						Red maple-----------	---	---	
						Bigtooth aspen------	---	---	
						Eastern hemlock-----	---	---	
						Yellow birch--------	---	---	
146A**:									
Allendale------	4W	Slight	Severe	Slight	Moderate	Quaking aspen-------	60	64	White spruce, eastern white pine.
						Eastern white pine--	---	---	
						White spruce--------	---	---	
						Paper birch---------	---	---	
						Balsam fir----------	---	---	
						Red maple-----------	---	---	
Fibre----------	3W	Slight	Severe	Severe	Severe	Black spruce--------	39	49	
						Quaking aspen-------	---	---	
						Balsam fir----------	---	---	
						Tamarack------------	---	---	
						Paper birch---------	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
147B, 147D: Shelter	4X	Slight	Severe	Moderate	Severe	Balsam fir	34	58	
						White spruce	---	---	
						Northern whitecedar	---	---	
						Quaking aspen	50	43	
						Black spruce	---	---	
						Paper birch	---	---	
						Balsam poplar	---	---	
						Red maple	---	---	
148B**:									
Longrie	3D	Slight	Moderate	Slight	Moderate	Sugar maple	61	38	Eastern white pine, red pine, white spruce.
						Yellow birch	---	---	
						American beech	---	---	
						Quaking aspen	---	---	
						Red pine	---	---	
						American basswood	---	---	
						Black cherry	---	---	
						Balsam fir	---	---	
Rock outcrop.									
149B: Kalkaska	3S	Slight	Moderate	Moderate	Slight	Sugar maple	64	40	Red pine, eastern white pine.
						Quaking aspen	---	---	
						Red pine	---	---	
						Eastern white pine	---	---	
						American beech	---	---	
						Paper birch	---	---	
						Northern red oak	---	---	
						Red maple	63	39	
						Bigtooth aspen	---	---	
150: Fibre	3W	Slight	Severe	Severe	Severe	Black spruce	39	39	
						Quaking aspen	---	---	
						Balsam fir	---	---	
						Tamarack	---	---	
						Paper birch	---	---	
151: Beavertail	3W	Slight	Severe	Severe	Severe	Northern whitecedar	26	37	
						Balsam fir	45	83	
						Quaking aspen	---	---	
						Black spruce	---	---	
						Paper birch	---	---	
154F**:									
Dawson	2W	Slight	Severe	Severe	Severe	Black spruce	15	23	
						Tamarack	---	---	
Deer Park	4R	Moderate	Moderate	Moderate	Slight	Red pine	45	85	Red pine, jack pine.
						Jack pine	46	87	
						Eastern white pine	---	---	
						Northern red oak	---	---	
						Quaking aspen	---	---	
						Paper birch	---	---	
Wainola	6W	Slight	Severe	Moderate	Severe	Quaking aspen	70	81	White spruce, Norway spruce, eastern white pine.
						Red maple	68	42	
						Northern red oak	68	4	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
155B**:									
Allendale	4W	Slight	Severe	Slight	Moderate	Quaking aspen	60	64	White spruce, eastern white pine.
						Eastern white pine	---	---	
						White spruce	---	---	
						Paper birch	---	---	
						Balsam fir	---	---	
						Red maple	---	---	
Posen	2X	Slight	Moderate	Slight	Slight	Sugar maple	62	39	White spruce, eastern white pine, red pine.
						Quaking aspen	---	---	
						Balsam fir	---	---	
						Yellow birch	---	---	
						American basswood	---	---	
						American beech	---	---	
						Red pine	---	---	
						Northern red oak	---	---	
Pickford	6W	Slight	Severe	Severe	Severe	White spruce	45	84	White spruce, eastern white pine.
						Balsam fir	45	83	
						Paper birch	---	---	
						Eastern hemlock	---	---	
						Quaking aspen	---	---	
						Northern whitecedar	---	---	
						Black ash	---	---	
156A**:									
Rockcut	3W	Slight	Severe	Severe	Severe	Paper birch	48	47	
						Balsam fir	---	---	
						Quaking aspen	---	---	
						Red maple	---	---	
						White spruce	---	---	
Pinconning	3W	Slight	Severe	Severe	Severe	Quaking aspen	50	43	
						Black ash	---	---	
						Black spruce	---	---	
						Northern whitecedar	---	---	
159B**:									
Amasa	3L	Slight	Moderate	Slight	Slight	Sugar maple	61	38	White spruce, red pine.
						Quaking aspen	65	73	
						Yellow birch	---	---	
						Eastern hemlock	---	---	
						Balsam fir	---	---	
						Red maple	---	---	
						Bigtooth aspen	---	---	
						Black cherry	---	---	
Sugar	3L	Slight	Severe	Slight	Moderate	Sugar maple	62	39	Red pine, eastern white pine.
						Quaking aspen	---	---	
						Eastern white pine	---	---	
						Paper birch	---	---	
						Red maple	---	---	

See footnotes at end of table.

TABLE 8.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Soil name and map symbol	Ordination symbol	Management concerns				Potential productivity			Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Windthrow hazard	Common trees	Site index	Volume*	
159F**:									
Amasa----------	3R	Severe	Severe	Slight	Slight	Sugar maple--------- Quaking aspen------- Yellow birch-------- Eastern hemlock----- Balsam fir---------- Red maple----------- Bigtooth aspen------ Black cherry--------	61 65 --- --- --- --- --- ---	38 73 --- --- --- --- --- ---	White spruce, red pine.
Sugar----------	3R	Severe	Severe	Slight	Slight	Sugar maple--------- Quaking aspen------- White spruce-------- Paper birch--------- Red maple-----------	62 --- --- --- ---	39 --- --- --- ---	Red pine, eastern white pine.

* Volume is the yield in cubic feet per acre per year calculated at the age of culmination of mean annual increment for fully stocked natural stands.

** See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--EQUIPMENT LIMITATIONS ON WOODLAND

(Only the soils suitable for production of commercial trees are listed. Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

	Ratings for most limiting season(s)				Ratings for preferred operating season(s)		
Map symbol and soil name	Logging areas and skid roads	Log landings	Haul roads	Preferred operating season(s)	Logging areas and skid roads	Log landings	Haul roads
10B--------------- Ontonagon	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight---------	Slight--------	Slight.
10D--------------- Ontonagon	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.	Summer, fall, winter.	Slight---------	Slight--------	Slight.
10F--------------- Ontonagon	Severe: slope.	Severe: slope.	Severe: slope.	Summer, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
11A--------------- Rudyard	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
12---------------- Pickford	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
13B--------------- Alcona	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight---------	Slight--------	Slight.
13D--------------- Alcona	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.	Summer, fall, winter.	Slight---------	Moderate: slope.	Slight.
13F--------------- Alcona	Severe: slope.	Severe: slope.	Severe: slope.	Year round.	Severe: slope.	Severe: slope.	Severe: slope.
14A--------------- Gaastra	Severe: wetness, low strength.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight---------	Slight--------	Slight.
15B--------------- Rousseau	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight---------	Slight--------	Slight.
15D--------------- Rousseau	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Spring, fall, winter.	Slight---------	Moderate: slope.	Slight.

TABLE 9.--EQUIPMENT LIMITATIONS ON WOODLAND--Continued

Map symbol and soil name	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operating season(s)		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	Haul roads
15E--------------- Rousseau	Moderate: too sandy, slope.	Severe: slope.	Moderate: too sandy, slope.	Spring, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
15F--------------- Rousseau	Severe: slope.	Severe: slope.	Severe: slope.	Spring, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
17D--------------- Deer Park	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight---------	Slight--------	Slight.
17F--------------- Deer Park	Severe: slope.	Severe: slope.	Severe: slope.	Spring, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
18B--------------- Rubicon	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight---------	Slight--------	Slight.
18D--------------- Rubicon	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Spring, fall, winter.	Slight---------	Moderate: slope.	Slight.
18E--------------- Rubicon	Moderate: too sandy, slope.	Severe: slope.	Moderate: too sandy, slope.	Spring, fall, winter.	Severe: slope.	Severe: slope.	Moderate: slope.
19B--------------- Kalkaska	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight---------	Slight--------	Slight.
19D--------------- Kalkaska	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Spring, fall, winter.	Slight---------	Moderate: slope.	Slight.
19E--------------- Kalkaska	Moderate: too sandy, slope.	Severe: slope.	Moderate: too sandy.	Spring, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
19F--------------- Kalkaska	Severe: slope.	Severe: slope.	Severe: slope.	Spring, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
20A--------------- Croswell	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight---------	Slight--------	Slight.

TABLE 9.--EQUIPMENT LIMITATIONS ON WOODLAND--Continued

Map symbol and soil name	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operating season(s)		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	Haul roads
21A--------------- Au Gres	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight---------	Slight--------	Slight.
22---------------- Kinross	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight---------	Slight--------	Slight.
23---------------- Roscommon	Severe: wetness, low strength.	Severe: wetness.	Severe: wetness.	Summer, winter.	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
25B--------------- Guardlake	Slight---------	Slight---------	Slight---------	Year round.	Slight---------	Slight--------	Slight.
27B--------------- Emmet	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight---------	Slight--------	Slight.
28B--------------- Longrie	Moderate: low strength.	Moderate: low strength, depth to rock.	Moderate: low strength. depth to rock.	Summer, fall, winter.	Slight---------	Moderate: depth to rock.	Moderate: depth to rock.
29A--------------- Solona	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter.	Slight---------	Slight--------	Slight.
32A--------------- Allendale	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight---------	Slight--------	Slight.
36*:							
Markey-----------	Severe: wetness, low strength.	Severe: wetness.	Severe: wetness.	Winter---	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
Carbondale-------	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter---	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
37*:							
Dawson-----------	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter---	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
Loxley-----------	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter---	Moderate: low strength.	Severe: low strength.	Moderate: low strength.

See footnote at end of table.

TABLE 9.--EQUIPMENT LIMITATIONS ON WOODLAND--Continued

Map symbol and soil name	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operating season(s)		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	Haul roads
38F*:							
Deer Park	Severe: slope.	Severe: slope.	Severe: slope.	Spring, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
Kinross	Severe: wetness.	Severe: wetness.	Severe: wetness.	Winter	Slight	Slight	Slight.
39D*:							
Au Gres	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight	Slight	Slight.
Dawson	Severe: wetness, low strength.	Severe: wetness.	Severe: wetness.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
Rubicon	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
40A*:							
Rudyard	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
Allendale	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight	Slight	Slight.
41D*:							
Summerville	Severe: rock outcrop.	Severe: rock outcrop, depth to rock.	Severe: rock outcrop, depth to rock.	Summer, fall, winter.	Severe: rock outcrop.	Severe: rock outcrop, depth to rock.	Severe: rock outcrop, depth to rock.
Rock outcrop.							
41F*:							
Summerville	Severe: rock outcrop, slope.	Severe: rock outcrop, depth to rock, slope.	Severe: rock outcrop, depth to rock, slope.	Summer, fall.	Severe: rock outcrop, slope.	Severe: rock outcrop, depth to rock, slope.	Severe: rock outcrop, depth to rock, slope.
Rock outcrop.							

See footnote at end of table.

TABLE 9.--EQUIPMENT LIMITATIONS ON WOODLAND--Continued

Map symbol and soil name	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operating season(s)		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	Haul roads
42D*:							
Emmet	Moderate: low strength.	Moderate: low strength, slope.	Moderate: low strength.	Summer, fall, winter.	Slight	Moderate: slope.	Slight.
Kalkaska	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Spring, fall, winter.	Slight	Moderate: slope.	Slight.
44B Posen	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Slight	Slight.
44D Posen	Moderate: low strength.	Moderate: slope, low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Moderate: slope.	Slight.
44E Posen	Moderate: low strength, slope.	Severe: slope.	Moderate: low strength, slope.	Summer, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
46B Pence	Slight	Slight	Slight	Year round.	Slight	Slight	Slight.
46D Pence	Slight	Moderate: slope.	Slight	Year round.	Slight	Moderate: slope.	Slight.
46E Pence	Moderate: slope.	Severe: slope.	Moderate: slope.	Year round.	Moderate: slope.	Severe: slope.	Moderate: slope.
48E*:							
Wainola	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight	Slight	Slight.
Kinross	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight	Slight	Slight.
Rousseau	Moderate: too sandy, slope.	Severe: slope.	Moderate: too sandy, slope.	Spring, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
49A Wainola	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight	Slight	Slight.
50 Deford	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight	Slight	Slight.

See footnote at end of table.

TABLE 9.--EQUIPMENT LIMITATIONS ON WOODLAND--Continued

Map symbol and soil name	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operating season(s)		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	Haul roads
52A Ingalls	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight	Slight	Slight.
53B Menomiee	Slight	Slight	Slight	Year round.	Slight	Slight	Slight.
56A Ensign	Severe: wetness, low strength, depth to rock.	Severe: wetness, low strength, depth to rock.	Severe: wetness, low strength, depth to rock.	Summer, winter.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
57B*:							
Summerville	Moderate: low strength.	Severe: depth to rock.	Severe: depth to rock.	Summer, fall, winter.	Slight	Severe: depth to rock.	Severe: depth to rock.
Longrie	Moderate: low strength.	Moderate: low strength, depth to rock.	Moderate: low strength.	Summer, fall, winter.	Slight	Moderate: depth to rock.	Moderate: depth to rock.
61A Halfaday	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
67B*:							
Duel	Severe: rock outcrop.	Severe: rock outcrop.	Severe: rock outcrop.	Year round.	Severe: rock outcrop.	Severe: rock outcrop.	Severe: rock outcrop.
Rock outcrop.							
68 Pinconning	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight	Slight	Slight.
78B Waiska	Slight	Slight	Slight	Year round.	Slight	Slight	Slight.
79B*:							
Kalkaska	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
Manistee	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.

See footnote at end of table.

TABLE 9.--EQUIPMENT LIMITATIONS ON WOODLAND--Continued

Map symbol and soil name	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operating season(s)		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	Haul roads
79D*:							
Kalkaska----------	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Spring, fall, winter.	Slight----------	Moderate: slope.	Slight.
Manistee----------	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Spring, fall, winter.	Slight----------	Moderate: slope.	Slight.
80B---------------- Superior	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight----------	Slight---------	Slight.
83A*:							
Allendale---------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight----------	Slight---------	Slight.
Croswell----------	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight----------	Slight---------	Slight.
84B*:							
Rousseau----------	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight----------	Slight---------	Slight.
Alcona------------	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight----------	Slight---------	Slight.
85B*:							
Kalkaska----------	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight----------	Slight---------	Slight.
Ocqueoc-----------	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight----------	Slight---------	Slight.
86A*:							
Ingalls-----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight----------	Slight---------	Slight.
Halfaday----------	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight----------	Slight---------	Slight.

See footnote at end of table.

TABLE 9.--EQUIPMENT LIMITATIONS ON WOODLAND--Continued

Map symbol and soil name	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operating season(s)		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	Haul roads
87B Rousseau	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
88A*:							
Croswell	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
Au Gres	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight	Slight	Slight.
89A*:							
Kinross	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight	Slight	Slight.
Au Gres	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight	Slight	Slight.
91B Rousseau	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight	Slight	Slight.
91E Rousseau	Moderate: too sandy, slope.	Severe: slope.	Moderate: too sandy, slope.	Spring, fall, winter.	Moderate: slope.	Severe: slope.	Moderate: slope.
92A Biscuit	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter.	Slight	Slight	Slight.
93F*:							
Ontonagon	Severe: slope.	Severe: slope.	Severe: slope.	Summer, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
Pickford	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
94A*:							
Markey	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
Kinross	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight	Slight	Slight.

See footnote at end of table.

TABLE 9.--EQUIPMENT LIMITATIONS ON WOODLAND--Continued

Map symbol and soil name	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operating season(s)		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	Haul roads
94A*:							
Au Gres	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight	Slight	Slight.
95A Bowers	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter.	Slight	Slight	Slight.
96B*:							
Velvet	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight	Moderate: too stony.	Moderate: too stony.
Westbury	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight	Moderate: too stony.	Moderate: too stony.
97A Wega	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter.	Slight	Slight	Slight.
98 Ermatinger	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter.	Slight	Slight	Slight.
99A Westbury	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight	Moderate: too stony.	Moderate: too stony.
101 Chippeny	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
102*:							
Kinross	Severe: wetness.	Severe: wetness.	Severe: wetness.	Winter	Slight	Slight	Slight.
Dawson	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
103D*:							
Velvet	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight	Moderate: too stony.	Moderate: too stony.
Rockbottom	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight	Moderate: too stony.	Moderate: too stony.

See footnote at end of table.

TABLE 9.--EQUIPMENT LIMITATIONS ON WOODLAND--Continued

Map symbol and soil name	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operating season(s)		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	Haul roads
103E*:							
Velvet	Moderate: slope.	Severe: slope.	Moderate: slope, too stony.	Year round.	Moderate: slope.	Severe: slope.	Moderate: slope, too stony.
Rockbottom	Moderate: slope.	Severe: slope.	Moderate: slope, too stony.	Year round.	Moderate: slope.	Severe: slope.	Moderate: slope, too stony.
104B Amasa	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight	Slight	Slight.
106A*:							
Potagannissing	Severe: wetness, rock outcrop, low strength.	Severe: wetness, rock outcrop, low strength.	Severe: wetness, rock outcrop, low strength.	Summer, winter.	Severe: rock outcrop.	Severe: rock outcrop.	Severe: rock outcrop.
Rock outcrop.							
107B Oldman	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight	Slight	Slight.
108D*:							
Shelter	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter.	Slight	Slight	Slight.
Alpena	Slight	Slight	Slight	Year round.	Slight	Slight	Slight.
111 Gutport	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
112 Soo	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter.	Slight	Slight	Slight.
113 Ruse	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter.	Slight	Slight	Slight.

See footnote at end of table.

TABLE 9.--EQUIPMENT LIMITATIONS ON WOODLAND--Continued

Map symbol and soil name	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operating season(s)		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	Haul roads
114B--------------- Velvet	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight----------	Moderate: too stony.	Moderate: too stony.
114D--------------- Velvet	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight----------	Moderate: slope, too stony.	Moderate: slope, too stony.
117B--------------- Manistee	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Summer, fall, winter.	Slight----------	Slight---------	Slight.
117D--------------- Manistee	Moderate: too sandy.	Moderate: too sandy, slope.	Moderate: too sandy.	Summer, fall, winter.	Slight----------	Moderate: slope.	Slight.
117F--------------- Manistee	Severe: slope.	Severe: slope.	Severe: slope.	Summer, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
119---------------- Gogomain	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter.	Slight----------	Slight---------	Slight.
121B--------------- Rockbottom	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight----------	Slight---------	Slight.
123B--------------- Ocqueoc	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight----------	Slight---------	Slight.
124D--------------- Alpena	Slight----------	Moderate: slope.	Slight----------	Year round.	Slight----------	Moderate: slope.	Slight.
125B*:							
Croswell----------	Moderate: too sandy.	Moderate: too sandy.	Moderate: too sandy.	Spring, fall, winter.	Slight----------	Slight---------	Slight.
Markey------------	Severe: wetness, low strength.	Severe: wetness.	Severe: wetness.	Winter---	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
126---------------- Pickford	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.

See footnote at end of table.

TABLE 9.--EQUIPMENT LIMITATIONS ON WOODLAND--Continued

Map symbol and soil name	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operating season(s)		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	Haul roads
127--------------- Gay	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter.	Slight---------	Slight--------	Slight.
128F*:							
Alcona-----------	Severe: slope.	Severe: slope.	Severe: slope.	Year round.	Severe: slope.	Severe: slope.	Severe: slope.
Markey-----------	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter---	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
129A-------------- Rudyard	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
130A*:							
Rudyard----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
Pickford---------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
132B-------------- Sugar	Severe: low strength.	Severe: low strength.	Severe: low strength.	Summer, fall, winter.	Slight---------	Slight--------	Slight.
132F-------------- Sugar	Severe: low strength, slope.	Severe: low strength, slope.	Severe: low strength, slope.	Summer, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
133--------------- Dora	Severe: wetness, low strength.	Severe: wetness.	Severe: wetness.	Winter---	Severe: low strength.	Severe: low strength.	Moderate: low strength.
135B*:							
Longrie----------	Moderate: low strength.	Moderate: low strength, depth to rock.	Moderate: low strength, depth to rock.	Summer, fall, winter.	Slight---------	Moderate: depth to rock.	Moderate: depth to rock.
Posen------------	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight---------	Slight--------	Slight.
136A*:							
Westbury---------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight---------	Slight--------	Slight.

See footnote at end of table.

TABLE 9.--EQUIPMENT LIMITATIONS ON WOODLAND--Continued

Map symbol and soil name	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operating season(s)		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	Haul roads
136A*: Gay	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter.	Slight	Slight	Slight.
137A*: Kinross	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight	Slight	Slight.
Wainola	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight	Slight	Slight.
143 Burleigh	Severe: wetness.	Severe: wetness.	Severe: wetness.	Winter	Slight	Slight	Slight.
145A*: Gaastra	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter.	Slight	Slight	Slight.
Gogomain	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter	Slight	Slight	Slight.
Ingalls	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight	Slight	Slight.
146A*: Allendale	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight	Slight	Slight.
Fibre	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight	Slight	Slight.
147B Shelter	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter.	Slight	Slight	Slight.
147D Shelter	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Summer, winter.	Slight	Moderate: slope.	Slight.
148B*: Longrie	Severe: rock outcrop.	Severe: rock outcrop.	Severe: rock outcrop.	Summer, fall, winter.	Severe: rock outcrop.	Severe: rock outcrop.	Severe: rock outcrop.
Rock outcrop.							

See footnote at end of table.

TABLE 9.--EQUIPMENT LIMITATIONS ON WOODLAND--Continued

Map symbol and soil name	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operating season(s)		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	Haul roads
150--------------- Fibre	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight---------	Slight--------	Slight.
151--------------- Beavertail	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter---	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
152--------------- Grousehaven	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter---	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
154F*:							
Dawson-----------	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter---	Moderate: low strength.	Severe: low strength.	Moderate: low strength.
Deer Park--------	Severe: slope.	Severe: slope.	Severe: slope.	Spring, fall, winter.	Severe: slope.	Severe: slope.	Severe: slope.
Wainola----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight---------	Slight--------	Slight.
155B*:							
Allendale--------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Slight---------	Slight--------	Slight.
Posen------------	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight---------	Slight--------	Slight.
Pickford---------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Summer, winter.	Moderate: too clayey.	Moderate: too clayey.	Moderate: too clayey.
156A*:							
Rockcut----------	Severe: wetness, low strength.	Severe: wetness, low strength.	Severe: wetness, low strength.	Winter---	Slight---------	Moderate: too stony.	Moderate: too stony.
Pinconning-------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Winter---	Slight---------	Slight--------	Slight.

See footnote at end of table.

TABLE 9.--EQUIPMENT LIMITATIONS ON WOODLAND--Continued

Map symbol and soil name	Ratings for most limiting season(s)			Preferred operating season(s)	Ratings for preferred operating season(s)		
	Logging areas and skid roads	Log landings	Haul roads		Logging areas and skid roads	Log landings	Haul roads
159B*:							
Amasa------------	Moderate: low strength.	Moderate: low strength.	Moderate: low strength.	Summer, fall, winter.	Slight---------	Slight--------	Slight.
Sugar------------	Severe: low strength.	Severe: low strength.	Severe: low strength.	Summer, fall, winter.	Slight---------	Slight--------	Slight.
159F*:							
Amasa------------	Severe: slope.	Severe: slope.	Severe: slope.	Summer, fall, winter.	Severe: slope.	Severe: slope.	Severe. slope.
Sugar------------	Severe: low strength, slope.	Severe: low strength, slope.	Severe: low strength, slope.	Summer, fall, winter.	Severe: slope.	Severe: slope.	Severe. slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

(The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil)

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
10B, 10D---------- Ontonagon	Amur privet, nannyberry viburnum, silky dogwood, common ninebark.	White spruce, northern whitecedar, Manchurian crabapple.	Norway spruce, eastern white pine, green ash.	---
10F--------------- Ontonagon	Northern whitecedar, American cranberrybush, lilac, Siberian crabapple, silky dogwood, Amur maple, nannyberry viburnum, redosier dogwood, common ninebark.	White spruce, Norway spruce.	Eastern white pine----	---
11A--------------- Rudyard	Amur privet, American cranberrybush, nannyberry viburnum, silky dogwood, lilac.	White spruce, Norway spruce, northern whitecedar, Manchurian crabapple.	Green ash, eastern white pine.	---
12---------------- Pickford	Silky dogwood, American cranberrybush, silky dogwood, common ninebark, nannyberry viburnum.	White spruce, Manchurian crabapple, red maple, northern whitecedar, Norway spruce.	Eastern white pine, green ash.	---
13B, 13D, 13F----- Alcona	Arrowwood, nannyberry viburnum, Siberian crabapple, Amur privet, American cranberrybush, lilac, silky dogwood.	White spruce----------	Norway spruce, eastern white pine, red pine.	Imperial Carolina poplar.
14A--------------- Gaastra	Roselow sargent crabapple, American cranberrybush, nannyberry viburnum, silky dogwood, common ninebark, Amur privet.	Northern whitecedar, Manchurian crabapple.	White spruce, eastern white pine, Norway spruce, green ash.	---
15B, 15D, 15E, 15F-------------- Rousseau	Siberian crabapple, lilac, Amur privet.	White spruce, eastern redcedar.	Red pine, eastern white pine, jack pine, Norway spruce.	Imperial Carolina poplar.
17D, 17F. Deer Park				
18B, 18D, 18E----- Rubicon	Eastern redcedar, Siberian crabapple, Amur privet, lilac, Amur maple, Siberian peashrub.	---	Red pine, eastern white pine, jack pine.	---

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
19B, 19D, 19E, 19F-------------- Kalkaska	Lilac, Amur maple, Amur privet, eastern redcedar, silky dogwood, Siberian peashrub, Siberian crabapple.	---	Red pine, jack pine, eastern white pine.	---
20A--------------- Croswell	Lilac, silky dogwood, Amur maple, Amur privet.	Eastern redcedar, Siberian crabapple.	Red pine, Norway spruce, eastern white pine, white spruce.	Imperial Carolina poplar.
21A--------------- Au Gres	Silky dogwood, American cranberrybush, Amur maple, common ninebark, nannyberry viburnum.	White spruce, Manchurian crabapple.	Norway spruce, jack pine, green ash, eastern white pine.	Imperial Carolina poplar.
22. Kinross				
23. Roscommon				
25B, 25D---------- Guardlake	Amur privet, lilac, Siberian peashrub, American cranberrybush.	White spruce, Amur maple, eastern redcedar, Siberian crabapple.	Red pine, eastern white pine, Norway spruce.	Imperial Carolina poplar.
27B--------------- Emmet	Arrowwood, lilac, nannyberry viburnum, Amur privet, Siberian peashrub.	Siberian crabapple, eastern redcedar.	White spruce, red pine, Norway spruce, eastern white pine.	Imperial Carolina poplar.
28B--------------- Longrie	Amur privet, lilac, common ninebark.	White spruce, Siberian crabapple, northern whitecedar, eastern redcedar.	Red pine, eastern white pine, Norway spruce, green ash.	Imperial Carolina poplar.
29A--------------- Solona	Common ninebark, lilac, silky dogwood, northern whitecedar, American cranberrybush, redosier dogwood, nannyberry viburnum.	White spruce----------	Eastern white pine, white ash, silver maple, red maple.	---
32A--------------- Allendale	American cranberrybush, silky dogwood, Amur privet, lilac, nannyberry viburnum, Roselow sargent crabapple.	White spruce, northern whitecedar, Manchurian crabapple.	Eastern white pine, red maple, Norway spruce.	---
33*. Pits				
34. Entisols				

See footnote at end of table.

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
35*:				
Histosols.				
Aquents.				
36*:				
Markey.				
Carbondale.				
37*:				
Dawson.				
Loxley	Common ninebark, nannyberry viburnum, silky dogwood.	Northern whitecedar	Siberian crabapple, eastern white pine, green ash.	---
38F*:				
Deer Park.				
Kinross.				
39D*:				
Au Gres	Silky dogwood, American cranberrybush, Amur maple, common ninebark, nannyberry viburnum.	White spruce, Manchurian crabapple.	Norway spruce, jack pine, green ash, eastern white pine.	Imperial Carolina poplar.
Dawson.				
Rubicon	Eastern redcedar, Siberian crabapple, Amur privet, lilac, Amur maple, Siberian peashrub.	---	Red pine, eastern white pine, jack pine.	---
40A*:				
Rudyard	Amur privet, American cranberrybush, nannyberry viburnum, silky dogwood, lilac.	White spruce, Norway spruce, northern whitecedar, Manchurian crabapple.	Green ash, eastern white pine.	---
Allendale	American cranberrybush, silky dogwood, Amur privet, lilac, nannyberry viburnum, Roselow sargent crabapple.	White spruce, northern whitecedar, Manchurian crabapple.	Eastern white pine, red maple, Norway spruce.	---
41D*, 41F*:				
Summerville.				
Rock outcrop.				
42D*:				
Emmet	Arrowwood, lilac, nannyberry viburnum, Amur privet, Siberian peashrub.	Siberian crabapple, eastern redcedar.	White spruce, red pine, Norway spruce, eastern white pine.	Imperial Carolina poplar.

See footnote at end of table.

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
42D*:				
Kalkaska	Lilac, Amur maple, Amur privet, eastern redcedar, silky dogwood, Siberian peashrub, Siberian crabapple.	---	Red pine, jack pine, eastern white pine.	---
44B, 44D, 44E. Posen				
46B, 46D, 46E Pence	Eastern redcedar, lilac, Amur maple, American cranberrybush, Siberian peashrub, silky dogwood, gray dogwood.	Norway spruce	Eastern white pine, red pine, jack pine.	---
48E*:				
Wainola	Silky dogwood, common ninebark, lilac, nannyberry viburnum, American cranberrybush, Amur privet.	White spruce, northern whitecedar, Manchurian crabapple.	Norway spruce, eastern white pine, jack pine.	---
Kinross.				
Rousseau	Siberian crabapple, silky dogwood, Amur privet.	White spruce, eastern redcedar.	Red pine, eastern white pine, jack pine, Norway spruce.	Imperial Carolina poplar.
49A Wainola	Silky dogwood, common ninebark, lilac, nannyberry viburnum, American cranberrybush, Amur privet.	White spruce, northern whitecedar, Manchurian crabapple.	Norway spruce, eastern white pine, jack pine.	---
50 Deford	Nannyberry viburnum, lilac, silky dogwood, American cranberrybush, common ninebark.	Northern whitecedar, Amur maple.	Eastern white pine, Norway spruce, white spruce, green ash.	Imperial Carolina poplar.
52A Ingalls	American cranberrybush, lilac, silky dogwood, Amur privet, common ninebark, Roselow sargent crabapple.	White spruce, northern whitecedar, Manchurian crabapple.	Norway spruce, eastern white pine, green ash.	---
53B Menominee	Lilac, arrowwood, nannyberry viburnum, Amur maple, Amur privet.	Eastern redcedar, Siberian crabapple.	Red pine, eastern white pine, Norway spruce, white spruce.	Imperial Carolina poplar.
56A. Ensign				

See footnote at end of table.

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
57B*: Summerville.				
Longrie	Amur privet, lilac, common ninebark.	White spruce, Siberian crabapple, northern whitecedar, eastern redcedar.	Red pine, eastern white pine, Norway spruce, green ash.	Imperial Carolina poplar.
61A Halfaday	Amur privet, lilac, white spruce, blue spruce, arrowwood, autumn olive, Siberian crabapple.	Austrian pine	Red pine, jack pine, eastern white pine.	---
67B*: Duel	Siberian crabapple, Amur privet, lilac, Siberian peashrub.	Amur maple, eastern redcedar.	Red pine, eastern white pine, Norway spruce.	Imperial Carolina poplar.
Rock outcrop.				
68. Pinconning				
78B Waiska	Amur maple, common ninebark, Roselow sargent crabapple, Siberian peashrub, lilac.	---	Red pine, Norway spruce, eastern white pine.	Imperial Carolina poplar.
79B*: Kalkaska	Lilac, Amur maple, Amur privet, eastern redcedar, silky dogwood, Siberian peashrub, Siberian crabapple.	---	Red pine, jack pine, eastern white pine.	---
Manistee	Amur maple, Amur privet, silky dogwood, Siberian peashrub.	White spruce, Siberian crabapple, eastern redcedar.	Red pine, Norway spruce, eastern white pine.	---
79D*: Kalkaska	Lilac, Amur maple, Amur privet, eastern redcedar, silky dogwood, Siberian peashrub, Siberian crabapple.	---	Red pine, jack pine, eastern white pine.	---
Manistee	Silky dogwood, Amur maple, nannyberry viburnum, lilac, Amur privet, American cranberrybush.	White spruce, Siberian crabapple, eastern redcedar.	Red pine, Norway spruce, eastern white pine.	---

See footnote at end of table.

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
80B----------------- Superior	Gray dogwood, silky dogwood, alternateleaf dogwood, Amur maple, American cranberrybush, lilac, northern whitecedar.	White spruce------------	Red maple, eastern white pine, red pine, white ash.	---
83A*:				
Allendale---------	American cranberrybush, silky dogwood, Amur privet, lilac, nannyberry viburnum, Roselow sargent crabapple.	White spruce, northern whitecedar, Manchurian crabapple.	Eastern white pine, red maple, Norway spruce.	---
Croswell----------	Lilac, silky dogwood, Amur maple, Amur privet.	Eastern redcedar, Siberian crabapple.	Red pine, Norway spruce, eastern white pine, white spruce.	Imperial Carolina poplar.
84B*, 84D*, 84F*:				
Rousseau----------	Siberian crabapple, lilac, Amur privet.	White spruce, eastern redcedar.	Red pine, eastern white pine, jack pine, Norway spruce.	Imperial Carolina poplar.
Alcona------------	Arrowwood, nannyberry viburnum, Siberian crabapple, Amur privet, American cranberrybush, lilac, silky dogwood.	White spruce------------	Norway spruce, eastern white pine, red pine.	Imperial Carolina poplar.
85B*:				
Kalkaska----------	Lilac, Amur maple, Amur privet, eastern redcedar, silky dogwood, Siberian peashrub, Siberian crabapple.	---	Red pine, jack pine, eastern white pine.	---
Ocqueoc-----------	Amur maple, lilac, arrowwood, Siberian peashrub, common ninebark, silky dogwood.	White spruce, Siberian crabapple.	Eastern white pine, jack pine, red pine, Norway spruce.	---
86A*:				
Ingalls-----------	American cranberrybush, lilac, silky dogwood, Amur privet, common ninebark, Roselow sargent crabapple.	White spruce, northern whitecedar, Manchurian crabapple.	Norway spruce, eastern white pine, green ash.	---
Halfaday----------	Amur privet, lilac, white spruce, blue spruce, arrowwood, autumn olive, Siberian crabapple.	Austrian pine-----------	Red pine, jack pine, eastern white pine.	---

See footnote at end of table.

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
87B--------------- Rousseau	Siberian crabapple, silky dogwood, Amur privet.	White spruce, eastern redcedar.	Red pine, eastern white pine, jack pine, Norway spruce.	Imperial Carolina poplar.
88A*:				
Croswell---------	Lilac, silky dogwood, Amur maple, Amur privet.	Eastern redcedar, Siberian crabapple.	Red pine, Norway spruce, eastern white pine, white spruce.	Imperial Carolina poplar.
Au Gres----------	Silky dogwood, American cranberrybush, Amur maple, common ninebark, nannyberry viburnum.	White spruce, Manchurian crabapple.	Norway spruce, jack pine, green ash, eastern white pine.	Imperial Carolina poplar.
89A*:				
Kinross.				
Au Gres----------	Silky dogwood, American cranberrybush, Amur maple, common ninebark, nannyberry viburnum.	White spruce, Manchurian crabapple.	Norway spruce, jack pine, green ash, eastern white pine.	Imperial Carolina poplar.
91B, 91D, 91E----- Rousseau	Siberian crabapple, silky dogwood, Amur privet.	White spruce, eastern redcedar.	Red pine, eastern white pine, jack pine, Norway spruce.	Imperial Carolina poplar.
92A--------------- Biscuit	American cranberrybush, silky dogwood, Amur privet, nannyberry viburnum, lilac, Roselow sargent crabapple.	White spruce, northern whitecedar, Manchurian crabapple.	Eastern white pine, red maple, Norway spruce.	---
93F*:				
Ontonagon--------	Northern whitecedar, American cranberrybush, lilac, Siberian crabapple, silky dogwood, Amur maple, nannyberry viburnum, redosier dogwood, common ninebark.	White spruce, Norway spruce.	Eastern white pine----	---
Pickford.				
94A*:				
Markey.				
Kinross.				
Au Gres----------	Silky dogwood, American cranberrybush, Amur maple, common ninebark, nannyberry viburnum.	White spruce, Manchurian crabapple.	Norway spruce, jack pine, green ash, eastern white pine.	Imperial Carolina poplar.

See footnote at end of table.

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of-- 8-15	16-25	26-35	>35
95A--------------- Bowers	Silky dogwood, American cranberrybush, Amur privet, lilac, common ninebark.	White spruce, northern whitecedar, Siberian crabapple.	Eastern white pine, Norway spruce, green ash, jack pine.	---
96B*:				
Velvet.				
Westbury.				
97A--------------- Wega	Northern whitecedar, lilac, American cranberrybush, nannyberry viburnum, silky dogwood, redosier dogwood.	White spruce----------	Eastern white pine, red pine, white ash, red maple, silver maple.	---
98. Ermatinger				
99A. Westbury				
101. Chippeny				
102*:				
Kinross.				
Dawson.				
103D*, 103E*:				
Velvet.				
Rockbottom.				
104B, 104D, 104F-- Amasa	Amur maple, lilac, Siberian peashrub, silky dogwood, common ninebark, Roselow sargent crabapple.	Siberian crabapple, white spruce.	Norway spruce, eastern white pine, jack pine, red pine.	---
106A*:				
Potagannissing.				
Rock outcrop.				
107B. Oldman				
108D*:				
Shelter.				
Alpena.				
111. Gutport				
112. Soo				

See footnote at end of table.

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
113. Ruse				
114B, 114D. Velvet				
116*. Udorthents				
117B Manistee	Amur maple, Amur privet, silky dogwood, Siberian peashrub.	White spruce, Siberian crabapple, eastern redcedar.	Red pine, Norway spruce, eastern white pine.	---
117D, 117F Manistee	Silky dogwood, Amur maple, nannyberry viburnum, lilac, Amur privet, American cranberrybush.	White spruce, Siberian crabapple, eastern redcedar.	Red pine, Norway spruce, eastern white pine.	---
119. Gogomain				
121B. Rockbottom				
122*. Pits				
123B Ocqueoc	Amur maple, lilac, arrowwood, Siberian peashrub, common ninebark, silky dogwood.	White spruce, Siberian crabapple.	Eastern white pine, jack pine, red pine, Norway spruce.	---
124D. Alpena				
125B*:				
Croswell	Lilac, silky dogwood, Amur maple, Amur privet.	Eastern redcedar, Siberian crabapple.	Red pine, Norway spruce, eastern white pine, white spruce.	Imperial Carolina poplar.
Markey.				
126 Pickford	Silky dogwood, American cranberrybush, silky dogwood, common ninebark, nannyberry viburnum.	White spruce, Manchurian crabapple, red maple, northern whitecedar, Norway spruce.	Eastern white pine, green ash.	---
127. Gay				
128F*:				
Alcona	Arrowwood, nannyberry viburnum, Siberian crabapple, Amur privet, American cranberrybush, lilac, silky dogwood.	White spruce	Norway spruce, eastern white pine, red pine.	Imperial Carolina poplar.

See footnote at end of table.

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
128F*: Markey.				
129A Rudyard	Amur privet, American cranberrybush, nannyberry viburnum, silky dogwood, lilac.	White spruce, Norway spruce, northern whitecedar, Manchurian crabapple.	Green ash, eastern white pine.	---
130A*: Rudyard	Amur privet, American cranberrybush, nannyberry viburnum, silky dogwood, lilac.	White spruce, Norway spruce, northern whitecedar, Manchurian crabapple.	Green ash, eastern white pine.	---
Pickford	Silky dogwood, American cranberrybush, silky dogwood, common ninebark, nannyberry viburnum.	White spruce, Manchurian crabapple, red maple, northern whitecedar, Norway spruce.	Eastern white pine, green ash.	---
132B, 132F Sugar	Silky dogwood, Amur maple, lilac, American cranberrybush.	White spruce, Siberian crabapple, northern whitecedar.	Red pine, Norway spruce, eastern white pine, green ash.	Imperial Carolina poplar.
133. Dora				
135B*: Longrie	Amur privet, lilac, common ninebark.	White spruce, Siberian crabapple, northern whitecedar, eastern redcedar.	Red pine, eastern white pine, Norway spruce, green ash.	Imperial Carolina poplar.
Posen.				
136A*: Westbury.				
Gay.				
137A*: Kinross.				
Wainola	Silky dogwood, common ninebark, lilac, nannyberry viburnum, American cranberrybush, Amur privet.	White spruce, northern whitecedar, Manchurian crabapple.	Norway spruce, eastern white pine, jack pine.	---
138B*: Rousseau	Siberian crabapple, lilac, Amur privet.	White spruce, eastern redcedar.	Red pine, eastern white pine, jack pine, Norway spruce.	Imperial Carolina poplar.
Urban land.				

See footnote at end of table.

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
139A*:				
Rudyard----------	Amur privet, American cranberrybush, nannyberry viburnum, silky dogwood, lilac.	White spruce, Norway spruce, northern whitecedar, Manchurian crabapple.	Green ash, eastern white pine.	---
Urban land.				
143. Burleigh				
144*: Urban land.				
Udorthents.				
145A*:				
Gaastra----------	Roselow sargent crabapple, American cranberrybush, nannyberry viburnum, silky dogwood, common ninebark, Amur privet.	Northern whitecedar, Manchurian crabapple.	White spruce, eastern white pine, Norway spruce, green ash.	---
Gogomain.				
Ingalls----------	American cranberrybush, lilac, silky dogwood, Amur privet, common ninebark, Roselow sargent crabapple.	White spruce, northern whitecedar, Manchurian crabapple.	Norway spruce, eastern white pine, green ash.	---
146A*:				
Allendale--------	American cranberrybush, silky dogwood, Amur privet, lilac, nannyberry viburnum, Roselow sargent crabapple.	White spruce, northern whitecedar, Manchurian crabapple.	Eastern white pine, red maple, Norway spruce.	---
Fibre.				
147B, 147D. Shelter				
148B*:				
Longrie----------	Amur privet, lilac, common ninebark.	White spruce, Siberian crabapple, northern whitecedar, eastern redcedar.	Red pine, eastern white pine, Norway spruce, green ash.	Imperial Carolina poplar.
Rock outcrop.				
149B-------------- Kalkaska	Lilac, Amur maple, Amur privet, eastern redcedar, silky dogwood, Siberian peashrub, Siberian crabapple.	---	Red pine, jack pine, eastern white pine.	---

See footnote at end of table.

TABLE 10.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS--Continued

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
150. Fibre				
151. Beavertail				
152. Grousehaven				
153*. Dumps				
154F*: Dawson.				
Deer Park.				
Wainola	Silky dogwood, common ninebark, lilac, nannyberry viburnum, American cranberrybush, Amur privet.	White spruce, northern whitecedar, Manchurian crabapple.	Norway spruce, eastern white pine, jack pine.	---
155B*: Allendale	American cranberrybush, silky dogwood, Amur privet, lilac, nannyberry viburnum, Roselow sargent crabapple.	White spruce, northern whitecedar, Manchurian crabapple.	Eastern white pine, red maple, Norway spruce.	---
Posen.				
Pickford	Silky dogwood, American cranberrybush, silky dogwood, common ninebark, nannyberry viburnum.	White spruce, Manchurian crabapple, red maple, northern whitecedar, Norway spruce.	Eastern white pine, green ash.	---
156A*: Rockcut.				
Pinconning.				
159B*, 159F*: Amasa	Amur maple, lilac, Siberian peashrub, silky dogwood, common ninebark, Roselow sargent crabapple.	Siberian crabapple, white spruce.	Norway spruce, eastern white pine, jack pine, red pine.	---
Sugar	Silky dogwood, Amur maple, lilac, American cranberrybush.	White spruce, Siberian crabapple, northern whitecedar.	Red pine, Norway spruce, eastern white pine, green ash.	Imperial Carolina poplar.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
10B------------------- Ontonagon	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight.
10D------------------- Ontonagon	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.
10F------------------- Ontonagon	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
11A------------------- Rudyard	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
12-------------------- Pickford	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.
13B------------------- Alcona	Slight---------------	Slight---------------	Moderate: slope.	Slight.
13D------------------- Alcona	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
13F------------------- Alcona	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
14A------------------- Gaastra	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.
15B------------------- Rousseau	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
15D------------------- Rousseau	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.
15E, 15F-------------- Rousseau	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy, slope.
17D------------------- Deer Park	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.
17F------------------- Deer Park	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy, slope.
18B------------------- Rubicon	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
18D------------------- Rubicon	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
18E Rubicon	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy, slope.
19B Kalkaska	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
19D Kalkaska	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.
19E, 19F Kalkaska	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy, slope.
20A Croswell	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
21A Au Gres	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.
22 Kinross	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
23 Roscommon	Severe: ponding, excess humus.	Severe: ponding.	Severe: ponding.	Severe: ponding.
25B Guardlake	Slight	Slight	Moderate: slope, small stones.	Slight.
25D Guardlake	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
27B Emmet	Slight	Slight	Moderate: slope, small stones.	Slight.
28B Longrie	Slight	Slight	Moderate: slope, small stones, thin layer.	Slight.
29A Solona	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
32A Allendale	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.
33*. Pits				
34. Entisols				
35*: Histosols.				

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
35*:				
Aquents.				
36*:				
Markey	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
Carbondale	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
37*:				
Dawson	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
Loxley	Severe: ponding, excess humus, too acid.	Severe: ponding, excess humus, too acid.	Severe: excess humus, ponding, too acid.	Severe: ponding, excess humus.
38F*:				
Deer Park	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy, slope.
Kinross	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.
39D*:				
Au Gres	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.
Dawson	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
Rubicon	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.
40A*:				
Rudyard	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Allendale	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.
41D*:				
Summerville	Severe: thin layer, area reclaim.	Severe: thin layer, area reclaim.	Severe: slope, thin layer, area reclaim.	Slight.
Rock outcrop.				

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
41F*:				
Summerville	Severe: slope, thin layer, area reclaim.	Severe: slope, thin layer, area reclaim.	Severe: slope, thin layer, area reclaim.	Severe: slope.
Rock outcrop.				
42D*:				
Emmet	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
Kalkaska	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.
44B Posen	Moderate: large stones.	Moderate: large stones.	Severe: large stones.	Moderate: large stones.
44D Posen	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: large stones, slope.	Moderate: large stones.
44E Posen	Severe: slope.	Severe: slope.	Severe: large stones, slope.	Severe: slope.
46B Pence	Slight	Slight	Moderate: slope, small stones.	Slight.
46D Pence	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
46E Pence	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
48E*:				
Wainola	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.
Kinross	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Rousseau	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy.
49A Wainola	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.
50 Deford	Severe: ponding, too sandy.	Severe: ponding, too sandy.	Severe: too sandy, ponding.	Severe: ponding, too sandy.
52A Ingalls	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
53B Menominee	Moderate	Moderate: too sandy.	Moderate: slope.	Moderate: too sandy.
56A Ensign	Severe: wetness, thin layer, area reclaim.	Severe: wetness, thin layer, area reclaim.	Severe: wetness, thin layer, area reclaim.	Severe: wetness.
57B*:				
Summerville	Severe: thin layer, area reclaim.	Severe: thin layer, area reclaim.	Severe: thin layer, area reclaim.	Slight.
Longrie	Slight	Slight	Moderate: slope, small stones, thin layer.	Slight.
61A Halfaday	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
67B*:				
Duel	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
Rock outcrop.				
68 Pinconning	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.
78B Waiska	Slight	Slight	Moderate: slope, small stones.	Slight.
79B*:				
Kalkaska	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
Manistee	Severe: percs slowly, too sandy.	Severe: too sandy, percs slowly.	Severe: too sandy, percs slowly.	Severe: too sandy.
79D*:				
Kalkaska	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.
Manistee	Severe: percs slowly, too sandy.	Severe: too sandy, percs slowly.	Severe: slope, too sandy, percs slowly.	Severe: too sandy.
80B Superior	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight.
83A*:				
Allendale	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
83A*:				
Croswell	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
84B*:				
Rousseau	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
Alcona	Slight	Slight	Moderate: slope.	Slight.
84D*:				
Rousseau	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.
Alcona	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
84F*:				
Rousseau	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy, slope.
Alcona	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
85B*:				
Kalkaska	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
Ocqueoc	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
86A*:				
Ingalls	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Halfaday	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
87B Rousseau	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
88A*:				
Croswell	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
Au Gres	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.
89A*:				
Kinross	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Au Gres	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.
91B Rousseau	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
91D------------------- Rousseau	Severe: too sandy.	Severe: too sandy.	Severe: slope, too sandy.	Severe: too sandy.
91E------------------- Rousseau	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy, slope.
92A------------------- Biscuit	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness, percs slowly.	Severe: wetness.
93F*:				
Ontonagon------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Pickford-------------	Severe: flooding, ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.
94A*:				
Markey---------------	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
Kinross--------------	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Au Gres--------------	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.
95A------------------- Bowers	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.
96B*:				
Velvet---------------	Severe: large stones, wetness, percs slowly.	Severe: large stones, percs slowly.	Severe: large stones, small stones.	Severe: large stones.
Westbury-------------	Severe: wetness.	Severe: wetness.	Severe: large stones, small stones.	Severe: wetness.
97A------------------- Wega	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.
98-------------------- Ermatinger	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
99A------------------- Westbury	Severe: wetness.	Severe: wetness.	Severe: large stones, small stones.	Severe: wetness.
101------------------- Chippeny	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
102*:				
Kinross	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Dawson	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
103D*:				
Velvet	Severe: large stones, wetness, percs slowly.	Severe: large stones, percs slowly.	Severe: large stones, slope, small stones.	Severe: large stones.
Rockbottom	Moderate: slope, wetness.	Moderate: slope, wetness.	Severe: slope.	Moderate: large stones, wetness.
103E*:				
Velvet	Severe: slope, large stones, percs slowly.	Severe: slope, large stones, percs slowly.	Severe: large stones, slope, small stones.	Severe: large stones, slope.
Rockbottom	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
104B Amasa	Slight	Slight	Moderate: slope.	Slight.
104D Amasa	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight.
104F Amasa	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
106A*:				
Potagannissing	Severe: wetness, thin layer, area reclaim.	Severe: wetness, thin layer, area reclaim.	Severe: wetness, thin layer.	Severe: wetness.
Rock outcrop.				
107B Oldman	Severe: large stones, wetness, percs slowly.	Severe: large stones, percs slowly.	Severe: large stones, small stones.	Severe: large stones.
108D*:				
Shelter	Severe: large stones, wetness.	Severe: wetness, large stones.	Severe: large stones, slope, small stones.	Severe: large stones, wetness.
Alpena	Slight	Slight	Severe: slope, small stones.	Slight.
111 Gutport	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
112 Soo	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
113 Ruse	Severe: ponding, depth to rock.	Severe: ponding, depth to rock.	Severe: ponding, depth to rock.	Severe: ponding.
114B Velvet	Severe: large stones, wetness, percs slowly.	Severe: large stones, percs slowly.	Severe: large stones, small stones.	Severe: large stones.
114D Velvet	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: slope, small stones.	Moderate: large stones, wetness.
116*. Udorthents				
117B Manistee	Severe: percs slowly, too sandy.	Severe: too sandy, percs slowly.	Severe: too sandy, percs slowly.	Severe: too sandy.
117D Manistee	Severe: percs slowly, too sandy.	Severe: too sandy, percs slowly.	Severe: slope, too sandy, percs slowly.	Severe: too sandy.
117F Manistee	Severe: slope, percs slowly, too sandy.	Severe: slope, too sandy, percs slowly.	Severe: slope, too sandy, percs slowly.	Severe: too sandy, slope.
119 Gogomain	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.
121B Rockbottom	Moderate: wetness.	Moderate: wetness.	Moderate: large stones, slope, wetness.	Moderate: large stones, wetness.
122*. Pits				
123B Ocqueoc	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
124D Alpena	Slight	Slight	Severe: slope, small stones.	Slight.
125B*:				
Croswell	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
Markey	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
126------------------- Pickford	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.
127------------------- Gay	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
128F*:				
Alcona---------------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Markey---------------	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
129A------------------ Rudyard	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
130A*:				
Rudyard--------------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Pickford-------------	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.
132B------------------ Sugar	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.
132F------------------ Sugar	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope.
133------------------- Dora	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
135B*:				
Longrie--------------	Slight---------------	Slight---------------	Moderate: slope, small stones, thin layer.	Slight.
Posen----------------	Moderate: large stones.	Moderate: large stones.	Severe: large stones.	Moderate: large stones.
136A*:				
Westbury-------------	Severe: wetness.	Severe: wetness.	Severe: large stones, small stones.	Severe: wetness.
Gay------------------	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
137A*:				
Kinross--------------	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
Wainola--------------	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
138B*:				
Rousseau	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.
Urban land.				
139A*:				
Rudyard	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Urban land.				
143 Burleigh	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
144*:				
Urban land.				
Udorthents.				
145A*:				
Gaastra	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.
Gogomain	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.
Ingalls	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
146A*:				
Allendale	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.
Fibre	Severe: ponding, percs slowly, excess humus.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.
147B Shelter	Severe: large stones, wetness.	Severe: wetness, large stones.	Severe: large stones, small stones.	Severe: large stones, wetness.
147D Shelter	Severe: large stones, wetness.	Severe: wetness, large stones.	Severe: large stones, slope, small stones.	Severe: large stones, wetness.
148B*:				
Longrie	Slight	Slight	Moderate: slope, small stones, thin layer.	Slight.
Rock outcrop.				
149B Kalkaska	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.	Severe: too sandy.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
150 Fibre	Severe: ponding, percs slowly, excess humus.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.
151 Beavertail	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
152 Grousehaven	Severe: ponding, percs slowly, excess humus.	Severe: ponding, excess humus, percs slowly.	Severe: excess humus, ponding, percs slowly.	Severe: ponding, excess humus.
153*. Dumps				
154F*:				
Dawson	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.
Deer Park	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: slope, too sandy.	Severe: too sandy, slope.
Wainola	Severe: wetness, too sandy.	Severe: wetness, too sandy.	Severe: too sandy, wetness.	Severe: wetness, too sandy.
155B*:				
Allendale	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.
Posen	Moderate: large stones.	Moderate: large stones.	Severe: large stones.	Moderate: large stones.
Pickford	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.
156A*:				
Rockcut	Severe: large stones, wetness.	Severe: wetness, large stones.	Severe: large stones, small stones, wetness.	Severe: large stones, wetness.
Pinconning	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.
159B*:				
Amasa	Slight	Slight	Moderate: slope.	Slight.
Sugar	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: wetness, percs slowly.	Moderate: wetness.

See footnote at end of table.

TABLE 11.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails
159F*:				
Amasa	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Sugar	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
10B Ontonagon	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
10D Ontonagon	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
10F Ontonagon	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
11A Rudyard	Fair	Good	Good	Good	Good	Good	Fair	Good	Good	Fair.
12 Pickford	Poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good.
13B, 13D Alcona	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
13F Alcona	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
14A Gaastra	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
15B Rousseau	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Poor.
15D Rousseau	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
15E, 15F Rousseau	Poor	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
17D, 17F Deer Park	Very poor.	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
18B Rubicon	Poor	Poor	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
18D Rubicon	Poor	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
18E Rubicon	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
19B Kalkaska	Fair	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
19D Kalkaska	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
19E Kalkaska	Very poor.	Poor	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
19F Kalkaska	Very poor.	Very poor.	Fair	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.

TABLE 12.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
20A---------------- Croswell	Poor	Poor	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
21A---------------- Au Gres	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor.
22----------------- Kinross	Very poor.	Poor	Poor	Fair	Fair	Good	Good	Very poor.	Fair	Good.
23----------------- Roscommon	Poor	Poor	Poor	Fair	Fair	Good	Good	Poor	Fair	Good.
25B---------------- Guardlake	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
25D---------------- Guardlake	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
27B---------------- Emmet	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
28B---------------- Longrie	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
29A---------------- Solona	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
32A---------------- Allendale	Fair	Fair	Good	Good	Good	Poor	Fair	Fair	Good	Poor.
33*. Pits										
34. Entisols										
35*: Histosols.										
Aquents.										
36*: Markey------------	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Carbondale--------	Fair	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
37*: Dawson------------	Very poor.	Poor	Poor	Poor	Poor	Poor	Good	Poor	Poor	Fair.
Loxley------------	Very poor.	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
38F*: Deer Park---------	Very poor.	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Kinross-----------	Very poor.	Poor	Poor	Fair	Fair	Good	Good	Very poor.	Fair	Good.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
39D*:										
Au Gres-----------	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor.
Dawson------------	Very poor.	Poor	Poor	Poor	Poor	Poor	Good	Poor	Poor	Fair.
Rubicon-----------	Poor	Poor	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
40A*:										
Rudyard-----------	Fair	Good	Good	Good	Good	Good	Fair	Good	Good	Fair.
Allendale---------	Fair	Fair	Good	Good	Good	Poor	Fair	Fair	Good	Poor.
41D*:										
Summerville-------	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Rock outcrop.										
41F*:										
Summerville-------	Very poor.	Poor	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Rock outcrop.										
42D*:										
Emmet-------------	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Kalkaska----------	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
44B, 44D----------- Posen	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
44E---------------- Posen	Very poor.	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
46B, 46D----------- Pence	Fair	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
46E---------------- Pence	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
48E*:										
Wainola-----------	Fair	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.
Kinross-----------	Very poor.	Poor	Poor	Fair	Fair	Good	Good	Very poor.	Fair	Good.
Rousseau----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
49A---------------- Wainola	Fair	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.
50----------------- Deford	Fair	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
52A---------------- Ingalls	Fair	Fair	Good	Fair	Fair	Fair	Fair	Fair	Fair	Fair.
53B---------------- Menominee	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
56A---------------- Ensign	Poor	Poor	Fair	Fair	Fair	Fair	Poor	Poor	Fair	Poor.
57B*:										
Summerville-------	Fair	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
Longrie-----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
61A---------------- Halfaday	Fair	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
67B*:										
Duel--------------	Poor	Poor	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Rock outcrop.										
68----------------- Pinconning	Poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good.
78B---------------- Waiska	Poor	Poor	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
79B*:										
Kalkaska----------	Fair	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Manistee----------	Fair	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
79D*:										
Kalkaska----------	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Manistee----------	Fair	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
80B---------------- Superior	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
83A*:										
Allendale---------	Fair	Fair	Good	Good	Good	Poor	Fair	Fair	Good	Poor.
Croswell----------	Poor	Poor	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
84B*:										
Rousseau----------	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Poor.
Alcona------------	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
84D*:										
Rousseau----------	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Alcona------------	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
84F*:										
Rousseau----------	Poor	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Alcona------------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
85B*:										
Kalkaska----------	Fair	Fair	Fair	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Ocqueoc-----------	Fair	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
86A*:										
Ingalls-----------	Fair	Fair	Good	Fair	Fair	Fair	Fair	Fair	Fair	Fair.
Halfaday----------	Fair	Fair	Fair	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
87B---------------- Rousseau	Fair	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Poor.
88A*:										
Croswell----------	Poor	Poor	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
Au Gres-----------	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor.
89A*:										
Kinross-----------	Very poor.	Poor	Poor	Fair	Fair	Good	Good	Very poor.	Fair	Good.
Au Gres-----------	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor.
91B---------------- Rousseau	Fair	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
91D---------------- Rousseau	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
91E---------------- Rousseau	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
92A---------------- Biscuit	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
93F*:										
Ontonagon---------	Poor	Fair	Fair	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Pickford----------	Very poor.	Very poor.	Fair	Poor	Poor	Good	Good	Poor	Poor	Good.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
94A*:										
Markey	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
Kinross	Very poor.	Poor	Poor	Fair	Fair	Good	Good	Very poor.	Fair	Good.
Au Gres	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor.
95A Bowers	Fair	Good	Good	Good	Good	Good	Fair	Good	Good	Fair.
96B*:										
Velvet	Very poor.	Poor	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor.
Westbury	Very poor.	Poor	Fair	Fair	Fair	Fair	Fair	Poor	Fair	Fair.
97A Wega	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
98 Ermatinger	Poor	Fair	Poor	Fair	Fair	Good	Fair	Poor	Fair	Fair.
99A Westbury	Very poor.	Poor	Fair	Fair	Fair	Fair	Fair	Poor	Fair	Fair.
101 Chippeny	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair.
102*:										
Kinross	Very poor.	Poor	Poor	Fair	Fair	Good	Good	Very poor.	Fair	Good.
Dawson	Very poor.	Poor	Poor	Poor	Poor	Poor	Good	Poor	Poor	Fair.
103D*:										
Velvet	Very poor.	Poor	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor.
Rockbottom	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor.
103E*:										
Velvet	Very poor.	Poor	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor.
Rockbottom	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
104B Amasa	Fair	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
104D Amasa	Fair	Fair	Good	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
104F Amasa	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
106A*:										
Potagannissing----	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Fair	Very poor.	Poor	Very poor.	Very poor.
Rock outcrop.										
107B--------------- Oldman	Poor	Fair	Good	Poor	Fair	Poor	Poor	Fair	Good	Poor.
108D*:										
Shelter-----------	Poor	Poor	Fair	Fair	Fair	Fair	Very poor.	Poor	Fair	Very poor.
Alpena------------	Poor	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
111---------------- Gutport	Very poor.	Poor	Poor	Poor	Poor	Good	Fair	Poor	Poor	Fair.
112---------------- Soo	Poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good.
113---------------- Ruse	Poor	Poor	Fair	Poor	Fair	Good	Poor	Poor	Fair	Fair.
114B, 114D--------- Velvet	Very poor.	Poor	Fair	Fair	Fair	Poor	Poor	Poor	Fair	Poor.
116*. Udorthents										
117B, 117D--------- Manistee	Fair	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
117F--------------- Manistee	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
119---------------- Gogomain	Poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good.
121B--------------- Rockbottom	Poor	Fair	Good	Good	Good	Poor	Poor	Fair	Good	Poor.
122*. Pits										
123B--------------- Ocqueoc	Fair	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
124D--------------- Alpena	Poor	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
125B*:										
Croswell----------	Poor	Poor	Fair	Fair	Fair	Poor	Very poor.	Poor	Fair	Very poor.
Markey------------	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
126---------------- Pickford	Poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
127 Gay	Poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good.
128F*:										
Alcona	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Markey	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
129A Rudyard	Fair	Good	Good	Good	Good	Good	Fair	Good	Good	Fair.
130A*:										
Rudyard	Fair	Good	Good	Good	Good	Good	Fair	Good	Good	Fair.
Pickford	Poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good.
132B Sugar	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
132F Sugar	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
133 Dora	Very poor.	Very poor.	Very poor.	Poor	Poor	Good	Good	Very poor.	Poor	Good.
135B*:										
Longrie	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Posen	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
136A*:										
Westbury	Very poor.	Poor	Fair	Fair	Fair	Fair	Fair	Poor	Fair	Fair.
Gay	Poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good.
137A*:										
Kinross	Very poor.	Poor	Poor	Fair	Fair	Good	Good	Very poor.	Fair	Good.
Wainola	Fair	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.
138B*:										
Rousseau	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Poor.
Urban land.										
139A*:										
Rudyard	Fair	Good	Good	Good	Good	Good	Fair	Good	Good	Fair.
Urban land.										
143 Burleigh	Very poor.	Very poor.	Fair	Fair	Fair	Good	Good	Very poor.	Fair	Good.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
144*:										
Urban land.										
Udorthents.										
145A*:										
Gaastra	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
Gogomain	Poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good.
Ingalls	Fair	Fair	Good	Fair	Fair	Fair	Fair	Fair	Fair	Fair.
146A*:										
Allendale	Fair	Fair	Good	Good	Good	Poor	Fair	Fair	Good	Poor.
Fibre	Poor	Fair	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair.
147B, 147D Shelter	Poor	Poor	Fair	Fair	Fair	Fair	Very poor.	Poor	Fair	Very poor.
148B*:										
Longrie	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Rock outcrop.										
149B Kalkaska	Poor	Poor	Fair	Good	Good	Very poor.	Very poor.	Poor	Fair	Very poor.
150 Fibre	Poor	Fair	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair.
151 Beavertail	Poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good.
152 Grousehaven	Very poor.	Poor	Poor	Poor	Poor	Fair	Good	Poor	Very poor.	Fair.
153*. Dumps										
154F*:										
Dawson	Very poor.	Poor	Poor	Poor	Poor	Poor	Good	Poor	Poor	Fair.
Deer Park	Very poor.	Poor	Poor	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Wainola	Fair	Fair	Fair	Good	Good	Poor	Poor	Fair	Good	Poor.
155B*:										
Allendale	Fair	Fair	Good	Good	Good	Poor	Fair	Fair	Good	Poor.
Posen	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Pickford	Poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good.

See footnote at end of table.

TABLE 12.--WILDLIFE HABITAT--Continued

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
156A*:										
Rockcut-----------	Very poor.	Poor	Poor	Good	Good	Fair	Fair	Poor	Fair	Fair.
Pinconning--------	Poor	Poor	Fair	Fair	Fair	Good	Good	Poor	Fair	Good.
159B*:										
Amasa-------------	Fair	Fair	Good	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
Sugar-------------	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
159F*:										
Amasa-------------	Very poor.	Fair	Good	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Sugar-------------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
10B Ontonagon	Moderate: too clayey, wetness.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Slight.
10D Ontonagon	Moderate: too clayey, wetness, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.	Moderate: slope.
10F Ontonagon	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
11A Rudyard	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, shrink-swell, wetness.	Severe: wetness.
12 Pickford	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding.	Severe: ponding.
13B Alcona	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Moderate: frost action.	Moderate: large stones, droughty.
13D Alcona	Severe: cutbanks cave.	Moderate: slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: large stones, droughty, slope.
13F Alcona	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
14A Gaastra	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
15B Rousseau	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
15D Rousseau	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
15E, 15F Rousseau	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
17D Deer Park	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Severe: droughty.
17F Deer Park	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
18B--------------- Rubicon	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Severe: droughty.
18D--------------- Rubicon	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
18E--------------- Rubicon	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
19B--------------- Kalkaska	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Severe: droughty.
19D--------------- Kalkaska	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
19E, 19F---------- Kalkaska	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
20A--------------- Croswell	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty, too sandy.
21A--------------- Au Gres	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
22---------------- Kinross	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, excess humus.
23---------------- Roscommon	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, excess humus.
25B--------------- Guardlake	Severe: cutbanks cave.	Moderate: large stones.	Moderate: large stones.	Moderate: large stones.	Moderate: large stones.	Severe: droughty.
25D--------------- Guardlake	Severe: cutbanks cave.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, large stones.	Severe: droughty.
27B--------------- Emmet	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Moderate: frost action.	Moderate: large stones.
28B--------------- Longrie	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock, frost action.	Moderate: large stones.
29A--------------- Solona	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness, droughty.
32A--------------- Allendale	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty.
33*. Pits						

See footnote at end of table.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
34. Entisols						
35*: Histosols.						
Aquents.						
36*: Markey	Severe: cutbanks cave, excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: ponding, frost action, subsides.	Severe: ponding, excess humus.
Carbondale	Severe: excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, frost action.	Severe: ponding, excess humus.
37*: Dawson	Severe: cutbanks cave, excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, frost action.	Severe: ponding, excess humus.
Loxley	Severe: excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, frost action.	Severe: too acid, ponding, excess humus.
38F*: Deer Park	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
Kinross	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
39D*: Au Gres	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Dawson	Severe: cutbanks cave, excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, frost action.	Severe: ponding, excess humus.
Rubicon	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Slight	Severe: droughty.
40A*: Rudyard	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, shrink-swell, wetness.	Severe: wetness.
Allendale	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty.

See footnote at end of table.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
41D*:						
Summerville------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.	Severe: thin layer, area reclaim.
Rock outcrop.						
41F*:						
Summerville------	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, thin layer, area reclaim.
Rock outcrop.						
42D*:						
Emmet------------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: large stones, slope.
Kalkaska---------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.
44B--------------- Posen	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.
44D--------------- Posen	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: slope, large stones.	Severe: large stones.	Severe: large stones.
44E--------------- Posen	Severe: large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, slope.
46B--------------- Pence	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: large stones, droughty.
46D--------------- Pence	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: large stones, droughty, slope.
46E--------------- Pence	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
48E*:						
Wainola----------	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
Kinross----------	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, excess humus.
Rousseau---------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.

See footnote at end of table.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
49A--------------- Wainola	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
50---------------- Deford	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
52A--------------- Ingalls	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
53B--------------- Menominee	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: large stones.
56A--------------- Ensign	Severe: depth to rock, wetness.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: depth to rock, wetness, frost action.	Severe: wetness, thin layer, area reclaim.
57B*:						
Summerville------	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: thin layer, area reclaim.
Longrie----------	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock, frost action.	Moderate: large stones.
61A--------------- Halfaday	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty, too sandy.
67B*:						
Duel-------------	Severe: cutbanks cave, depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock.	Moderate: thin layer, area reclaim, droughty.
Rock outcrop.						
68---------------- Pinconning	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding.	Severe: ponding.	Severe: ponding.
78B--------------- Waiska	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Severe: droughty.
79B*:						
Kalkaska---------	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Severe: droughty.
Manistee---------	Severe: cutbanks cave.	Slight---------	Severe: shrink-swell.	Slight---------	Slight---------	Moderate: droughty, too sandy.
79D*:						
Kalkaska---------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Severe: droughty.

See footnote at end of table.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
79D*:						
Manistee----------	Severe: cutbanks cave.	Moderate: slope.	Severe: shrink-swell.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope, too sandy.
80B---------------- Superior	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.	Moderate: droughty.
83A*:						
Allendale---------	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty.
Croswell----------	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty, too sandy.
84B*:						
Rousseau----------	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: droughty.
Alcona------------	Severe: cutbanks cave.	Slight---------	Moderate: wetness.	Slight---------	Moderate: frost action.	Moderate: large stones, droughty.
84D*:						
Rousseau----------	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
Alcona------------	Severe: cutbanks cave.	Moderate: slope.	Moderate: wetness, slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: large stones, droughty, slope.
84F*:						
Rousseau----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Alcona------------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
85B*:						
Kalkaska----------	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Severe: droughty.
Ocqueoc-----------	Severe: cutbanks cave.	Slight---------	Moderate: wetness, shrink-swell.	Slight---------	Slight---------	Moderate: droughty.
86A*:						
Ingalls-----------	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.

See footnote at end of table.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
86A*:						
Halfaday	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty, too sandy.
87B Rousseau	Severe: cutbanks cave.	Slight	Moderate: wetness.	Slight	Slight	Moderate: droughty.
88A*:						
Croswell	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty, too sandy.
Au Gres	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
89A*:						
Kinross	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, excess humus.
Au Gres	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
91B Rousseau	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Moderate: droughty.
91D Rousseau	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
91E Rousseau	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
92A Biscuit	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness, frost action.	Severe: wetness.
93F*:						
Ontonagon	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.	Severe: slope.
Pickford	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: ponding.
94A*:						
Markey	Severe: cutbanks cave, excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: ponding, frost action, subsides.	Severe: ponding, excess humus.
Kinross	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, excess humus.

See footnote at end of table.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
94A*: Au Gres	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
95A Bowers	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
96B*: Velvet	Severe: cutbanks cave, large stones, wetness.	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: large stones.	Severe: large stones, droughty.
Westbury	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, droughty.
97A Wega	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
98 Ermatinger	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.
99A Westbury	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, droughty.
101 Chippeny	Severe: ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, frost action.	Severe: ponding, excess humus.
102*: Kinross	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, excess humus.
Dawson	Severe: cutbanks cave, excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, frost action.	Severe: ponding, excess humus.
103D*: Velvet	Severe: cutbanks cave, large stones, wetness.	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: wetness, slope, large stones.	Severe: large stones.	Severe: large stones, droughty.
Rockbottom	Severe: wetness.	Moderate: wetness, slope, large stones.	Severe: wetness.	Severe: slope.	Moderate: wetness, slope, frost action.	Severe: large stones.
103E*: Velvet	Severe: cutbanks cave, large stones, slope.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: large stones, droughty, slope.

See footnote at end of table.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
103E*: Rockbottom-------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: large stones, slope.
104B-------------- Amasa	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Moderate: frost action.	Moderate: large stones.
104D-------------- Amasa	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: large stones, slope.
104F-------------- Amasa	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
106A*: Potagannissing---	Severe: depth to rock, wetness.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: wetness, depth to rock.	Severe: depth to rock, wetness, frost action.	Severe: wetness, thin layer, area reclaim.
Rock outcrop.						
107B-------------- Oldman	Severe: large stones, wetness.	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: large stones.	Severe: large stones.
108D*: Shelter----------	Severe: large stones, wetness.	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: wetness, frost action, large stones.	Severe: large stones, wetness.
Alpena-----------	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Severe: small stones, droughty.
111--------------- Gutport	Severe: depth to rock, ponding.	Severe: ponding.	Severe: ponding, depth to rock.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding, excess humus.
112--------------- Soo	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
113--------------- Ruse	Severe: depth to rock, ponding.	Severe: ponding, depth to rock.	Severe: ponding, depth to rock.	Severe: ponding, depth to rock.	Severe: depth to rock, ponding, frost action.	Severe: ponding, depth to rock.
114B-------------- Velvet	Severe: cutbanks cave, large stones, wetness.	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: large stones.	Severe: large stones, droughty.

See footnote at end of table.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
114D-------------- Velvet	Severe: cutbanks cave, large stones, wetness.	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: wetness, slope, large stones.	Severe: large stones.	Severe: large stones, droughty.
116*. Udorthents						
117B-------------- Manistee	Severe: cutbanks cave.	Moderate: wetness.	Severe: shrink-swell.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty, too sandy.
117D-------------- Manistee	Severe: cutbanks cave.	Moderate: slope.	Severe: shrink-swell.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope, too sandy.
117F-------------- Manistee	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope, shrink-swell.	Severe: slope.	Severe: slope.	Severe: slope.
119--------------- Gogomain	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.
121B-------------- Rockbottom	Severe: wetness.	Moderate: wetness, large stones.	Severe: wetness.	Moderate: wetness, slope, large stones.	Moderate: wetness, frost action.	Severe: large stones.
122*. Pits						
123B-------------- Ocqueoc	Severe: cutbanks cave.	Slight---------	Moderate: wetness, shrink-swell.	Slight---------	Slight---------	Moderate: droughty.
124D-------------- Alpena	Severe: cutbanks cave.	Slight---------	Slight---------	Moderate: slope.	Slight---------	Severe: small stones, droughty.
125B*: Croswell---------	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: droughty, too sandy.
Markey-----------	Severe: cutbanks cave, excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: ponding, frost action, subsides.	Severe: ponding, excess humus.
126--------------- Pickford	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding.	Severe: ponding.
127--------------- Gay	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: large stones, ponding.

See footnote at end of table.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
128F*:						
Alcona-----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Markey-----------	Severe: cutbanks cave, excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: ponding, frost action, subsides.	Severe: ponding, excess humus.
129A-------------- Rudyard	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, shrink-swell, wetness.	Severe: wetness.
130A*:						
Rudyard----------	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, shrink-swell, wetness.	Severe: wetness.
Pickford---------	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding.	Severe: ponding.
132B-------------- Sugar	Severe: cutbanks cave, wetness.	Moderate: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
132F-------------- Sugar	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.
133--------------- Dora	Severe: excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, shrink-swell.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, frost action.	Severe: ponding, excess humus.
135B*:						
Longrie----------	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock, frost action.	Moderate: large stones.
Posen------------	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.
136A*:						
Westbury---------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness, frost action.	Severe: wetness, droughty.
Gay--------------	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: large stones, ponding.
137A*:						
Kinross----------	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, excess humus.

See footnote at end of table.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
137A*:						
Wainola----------	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
138B*:						
Rousseau---------	Severe: cutbanks cave.	Slight---------	Slight---------	Slight---------	Slight---------	Moderate: droughty.
Urban land.						
139A*:						
Rudyard----------	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: low strength, shrink-swell, wetness.	Severe: wetness.
Urban land.						
143--------------- Burleigh	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
144*:						
Urban land.						
Udorthents.						
145A*:						
Gaastra----------	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
Gogomain---------	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding.
Ingalls----------	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
146A*:						
Allendale--------	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty.
Fibre------------	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding, excess humus.
147B-------------- Shelter	Severe: large stones, wetness.	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: wetness, frost action, large stones.	Severe: large stones, wetness.
147D-------------- Shelter	Severe: large stones, wetness.	Severe: wetness, large stones.	Severe: wetness, large stones.	Severe: wetness, slope, large stones.	Severe: wetness, frost action, large stones.	Severe: large stones, wetness.

See footnote at end of table.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
148B*:						
Longrie	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: depth to rock.	Moderate: depth to rock, frost action.	Moderate: large stones.
Rock outcrop.						
149B Kalkaska	Severe: cutbanks cave.	Slight	Slight	Slight	Slight	Severe: large stones, droughty.
150 Fibre	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding, excess humus.
151 Beavertail	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding, excess humus.
152 Grousehaven	Severe: excess humus, ponding.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: ponding, low strength.	Severe: low strength, ponding, frost action.	Severe: ponding, excess humus.
153*. Dumps						
154F*:						
Dawson	Severe: cutbanks cave, excess humus, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding.	Severe: subsides, ponding, low strength.	Severe: subsides, ponding, frost action.	Severe: ponding, excess humus.
Deer Park	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: droughty, slope.
Wainola	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.
155B*:						
Allendale	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Moderate: wetness, frost action.	Moderate: wetness, droughty.
Posen	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.	Severe: large stones.
Pickford	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding.	Severe: ponding.
156A*:						
Rockcut	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, wetness, frost action.	Severe: large stones, wetness.

See footnote at end of table.

TABLE 13.--BUILDING SITE DEVELOPMENT--Continued

Soil name and map symbol	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
156A*:						
Pinconning	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding.	Severe: ponding.	Severe: ponding.
159B*:						
Amasa	Severe: cutbanks cave.	Slight	Slight	Slight	Moderate: frost action.	Moderate: large stones.
Sugar	Severe: cutbanks cave, wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: frost action.	Moderate: wetness.
159F*:						
Amasa	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Sugar	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, frost action.	Severe: slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
10B----------------- Ontonagon	Severe: wetness, percs slowly.	Moderate: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
10D----------------- Ontonagon	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
10F----------------- Ontonagon	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
11A----------------- Rudyard	Severe: wetness, percs slowly.	Slight-----------	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
12------------------ Pickford	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
13B----------------- Alcona	Severe: wetness.	Severe: seepage, wetness.	Severe: too sandy.	Moderate: wetness.	Poor: too sandy.
13D----------------- Alcona	Severe: wetness.	Severe: seepage, slope, wetness.	Severe: too sandy.	Moderate: wetness, slope.	Poor: too sandy.
13F----------------- Alcona	Severe: slope.	Severe: seepage, slope.	Severe: slope, too sandy.	Severe: slope.	Poor: too sandy, slope.
14A----------------- Gaastra	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
15B----------------- Rousseau	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
15D----------------- Rousseau	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
15E, 15F------------ Rousseau	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: too sandy, slope.
17D----------------- Deer Park	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
17F Deer Park	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
18B Rubicon	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
18D Rubicon	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
18E Rubicon	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
19B Kalkaska	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
19D Kalkaska	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
19E, 19F Kalkaska	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
20A Croswell	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
21A Au Gres	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
22 Kinross	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
23 Roscommon	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
25B Guardlake	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
25D Guardlake	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
27B Emmet	Moderate: percs slowly.	Severe: seepage.	Severe: seepage.	Severe: seepage.	Fair: small stones.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
28B----------------- Longrie	Severe: thin layer, seepage.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Moderate: seepage.	Poor: area reclaim, thin layer.
29A----------------- Solona	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
32A----------------- Allendale	Severe: wetness, percs slowly, poor filter.	Severe: seepage.	Severe: wetness, too clayey.	Severe: seepage, wetness.	Poor: too clayey, hard to pack, wetness.
33*. Pits					
34. Entisols					
35*: Histosols.					
Aquents.					
36*: Markey-------------	Severe: subsides, ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Carbondale---------	Severe: subsides, ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
37*: Dawson-------------	Severe: subsides, ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
Loxley-------------	Severe: subsides, ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus, too acid.
38F*: Deer Park----------	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
Kinross------------	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
39D*: Au Gres------------	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.

See footnote at end of table.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
39D*:					
Dawson	Severe: subsides, ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
Rubicon	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
40A*:					
Rudyard	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Allendale	Severe: wetness, percs slowly, poor filter.	Severe: seepage.	Severe: wetness, too clayey.	Severe: seepage, wetness.	Poor: too clayey, hard to pack, wetness.
41D*:					
Summerville	Severe: thin layer, seepage.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: area reclaim, large stones.
Rock outcrop.					
41F*:					
Summerville	Severe: thin layer, seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Severe: seepage, slope.	Poor: area reclaim, large stones, slope.
Rock outcrop.					
42D*:					
Emmet	Moderate: percs slowly, slope.	Severe: seepage, slope.	Severe: seepage.	Severe: seepage.	Fair: small stones, slope.
Kalkaska	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
44B Posen	Severe: large stones.	Severe: large stones.	Severe: large stones.	Slight	Poor: large stones.
44D Posen	Severe: large stones.	Severe: slope, large stones.	Severe: large stones.	Moderate: slope.	Poor: large stones.
44E Posen	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope, large stones.	Severe: slope.	Poor: large stones, slope.
46B Pence	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.

See footnote at end of table.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
46D----------------- Pence	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
46E----------------- Pence	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
48E*:					
Wainola------------	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy, wetness.
Kinross------------	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Rousseau-----------	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
49A----------------- Wainola	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy, wetness.
50------------------ Deford	Severe: ponding, poor filter.	Severe: seepage, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: too sandy, ponding.
52A----------------- Ingalls	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage, wetness.	Poor: wetness.
53B----------------- Menominee	Severe: poor filter.	Severe: seepage.	Severe: too sandy.	Severe: seepage.	Poor: seepage, too sandy.
56A----------------- Ensign	Severe: thin layer, seepage, wetness.	Severe: depth to rock, seepage, wetness.	Severe: depth to rock, seepage, wetness.	Severe: seepage, wetness.	Poor: area reclaim, wetness, thin layer.
57B*:					
Summerville--------	Severe: thin layer, seepage.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage.	Poor: area reclaim, large stones.
Longrie------------	Severe: thin layer, seepage.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Moderate: seepage.	Poor: area reclaim, thin layer.

See footnote at end of table.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
61A Halfaday	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
67B*: Duel	Severe: thin layer, seepage, poor filter.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage, too sandy.	Severe: seepage.	Poor: area reclaim, seepage, too sandy.
Rock outcrop.					
68 Pinconning	Severe: ponding, percs slowly, poor filter.	Severe: seepage, ponding.	Severe: ponding, too clayey.	Severe: seepage, ponding.	Poor: too clayey, hard to pack, ponding.
78B Waiska	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
79B*: Kalkaska	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Manistee	Severe: wetness, percs slowly, poor filter.	Severe: seepage.	Severe: too clayey.	Severe: seepage.	Poor: too clayey, hard to pack.
79D*: Kalkaska	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Manistee	Severe: percs slowly, poor filter.	Severe: seepage, slope.	Severe: too clayey.	Severe: seepage.	Poor: too clayey, hard to pack.
80B Superior	Severe: percs slowly.	Severe: seepage.	Severe: too clayey.	Slight	Poor: too clayey, hard to pack.
83A*: Allendale	Severe: wetness, percs slowly, poor filter.	Severe: seepage.	Severe: wetness, too clayey.	Severe: seepage, wetness.	Poor: too clayey, hard to pack, wetness.
Croswell	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
84B*: Rousseau	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.

See footnote at end of table.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
84B*:					
Alcona	Severe: wetness.	Severe: seepage, wetness.	Severe: too sandy.	Moderate: wetness.	Poor: too sandy.
84D*:					
Rousseau	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
Alcona	Severe: wetness.	Severe: seepage, slope, wetness.	Severe: too sandy.	Moderate: wetness, slope.	Poor: too sandy.
84F*:					
Rousseau	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: too sandy, slope.
Alcona	Severe: slope.	Severe: seepage, slope.	Severe: slope, too sandy.	Severe: slope.	Poor: too sandy, slope.
85B*:					
Kalkaska	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
Ocqueoc	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy.
86A*:					
Ingalls	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage, wetness.	Poor: wetness.
Halfaday	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
87B Rousseau	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
88A*:					
Croswell	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
Au Gres	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.

See footnote at end of table.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
89A*:					
Kinross	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Au Gres	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
91B Rousseau	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
91D Rousseau	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
91E Rousseau	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
92A Biscuit	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
93F*:					
Ontonagon	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Pickford	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding, too clayey.	Severe: flooding, ponding.	Poor: too clayey, hard to pack, ponding.
94A*:					
Markey	Severe: subsides, ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Kinross	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Au Gres	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy, wetness.
95A Bowers	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.

See footnote at end of table.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
96B*:					
Velvet	Severe: wetness, percs slowly, large stones.	Severe: seepage, large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: large stones, wetness, seepage.
Westbury	Severe: wetness, percs slowly.	Moderate: slope, seepage, large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: seepage, small stones.
97A Wega	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
98 Ermatinger	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
99A Westbury	Severe: wetness, percs slowly.	Moderate: slope, seepage, large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: seepage, small stones.
101 Chippeny	Severe: thin layer, seepage, ponding.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: ponding.	Poor: area reclaim, ponding, excess humus.
102*:					
Kinross	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Dawson	Severe: subsides, ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
103D*:					
Velvet	Severe: wetness, percs slowly, large stones.	Severe: seepage, slope, large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: large stones, wetness, seepage.
Rockbottom	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: wetness, large stones.	Moderate: wetness, slope.	Poor: large stones.
103E*:					
Velvet	Severe: percs slowly, slope, large stones.	Severe: seepage, slope, large stones.	Severe: slope, large stones.	Severe: slope.	Poor: large stones, slope, seepage.
Rockbottom	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, large stones.	Severe: slope.	Poor: large stones, slope.

See footnote at end of table.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
104B---------------- Amasa	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
104D---------------- Amasa	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
104F---------------- Amasa	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
106A*:					
Potagannissing-----	Severe: thin layer, seepage, wetness.	Severe: depth to rock, seepage, wetness.	Severe: depth to rock, seepage, wetness.	Severe: seepage, wetness.	Poor: area reclaim, wetness, thin layer.
Rock outcrop.					
107B---------------- Oldman	Severe: wetness, percs slowly, large stones.	Severe: large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: seepage, large stones, wetness.
108D*:					
Shelter------------	Severe: wetness, percs slowly, large stones.	Severe: slope, large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: large stones, wetness.
Alpena-------------	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
111----------------- Gutport	Severe: depth to rock, ponding, percs slowly.	Severe: seepage, depth to rock, excess humus.	Severe: depth to rock, ponding, too clayey.	Severe: depth to rock, ponding.	Poor: depth to rock, too clayey, hard to pack.
112----------------- Soo	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
113----------------- Ruse	Severe: depth to rock, ponding.	Severe: seepage, depth to rock, ponding.	Severe: depth to rock, seepage, ponding.	Severe: depth to rock, ponding.	Poor: depth to rock, ponding.
114B---------------- Velvet	Severe: wetness, percs slowly, large stones.	Severe: seepage, large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: large stones, wetness, seepage.

See footnote at end of table.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
114D---------------- Velvet	Severe: wetness, percs slowly, large stones.	Severe: seepage, slope, large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: large stones, wetness, seepage.
116*. Udorthents					
117B---------------- Manistee	Severe: wetness, percs slowly, poor filter.	Severe: seepage.	Severe: too clayey.	Severe: seepage.	Poor: too clayey, hard to pack.
117D---------------- Manistee	Severe: percs slowly, poor filter.	Severe: seepage, slope.	Severe: too clayey.	Severe: seepage.	Poor: too clayey, hard to pack.
117F---------------- Manistee	Severe: percs slowly, poor filter, slope.	Severe: seepage, slope.	Severe: slope, too clayey.	Severe: seepage, slope.	Poor: too clayey, hard to pack, slope.
119----------------- Gogomain	Severe: ponding, percs slowly.	Severe: seepage, ponding.	Severe: ponding, too sandy.	Severe: seepage, ponding.	Poor: ponding, thin layer.
121B---------------- Rockbottom	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, large stones.	Moderate: wetness.	Poor: large stones.
122*. Pits					
123B---------------- Ocqueoc	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy.
124D---------------- Alpena	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
125B*: Croswell-----------	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: seepage, too sandy.
Markey-------------	Severe: subsides, ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
126----------------- Pickford	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.

See footnote at end of table.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
127------------------ Gay	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
128F*:					
Alcona--------------	Severe: slope.	Severe: seepage, slope.	Severe: slope, too sandy.	Severe: slope.	Poor: too sandy, slope.
Markey--------------	Severe: subsides, ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
129A----------------- Rudyard	Severe: wetness, percs slowly.	Slight-----------	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
130A*:					
Rudyard-------------	Severe: wetness, percs slowly.	Slight-----------	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Pickford------------	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
132B----------------- Sugar	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Severe: wetness, too sandy.	Severe: wetness.	Poor: wetness, thin layer.
132F----------------- Sugar	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too sandy.	Severe: slope.	Poor: slope, thin layer.
133------------------ Dora	Severe: subsides, ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: ponding, too clayey.	Severe: seepage, ponding.	Poor: too clayey, hard to pack, ponding.
135B*:					
Longrie-------------	Severe: thin layer, seepage.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Moderate: seepage.	Poor: area reclaim, thin layer.
Posen---------------	Severe: large stones.	Severe: large stones.	Severe: large stones.	Slight-----------	Poor: large stones.
136A*:					
Westbury------------	Severe: wetness, percs slowly.	Moderate: slope, seepage, large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: seepage, small stones.
Gay-----------------	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.

See footnote at end of table.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
137A*:					
Kinross	Severe: ponding, poor filter.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, too sandy.	Severe: seepage, ponding.	Poor: seepage, too sandy, ponding.
Wainola	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy, wetness.
138B*:					
Rousseau	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: too sandy.
Urban land.					
139A*:					
Rudyard	Severe: wetness, percs slowly.	Slight	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Urban land.					
143 Burleigh	Severe: ponding, percs slowly, poor filter.	Severe: seepage, ponding.	Severe: ponding, too sandy.	Severe: seepage, ponding.	Poor: ponding.
144*: Urban land.					
Udorthents.					
145A*:					
Gaastra	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
Gogomain	Severe: ponding, percs slowly.	Severe: seepage, ponding.	Severe: ponding, too sandy.	Severe: seepage, ponding.	Poor: ponding, thin layer.
Ingalls	Severe: wetness, percs slowly, poor filter.	Severe: seepage, wetness.	Severe: wetness.	Severe: seepage, wetness.	Poor: wetness.
146A*:					
Allendale	Severe: wetness, percs slowly, poor filter.	Severe: seepage.	Severe: wetness, too clayey.	Severe: seepage, wetness.	Poor: too clayey, hard to pack, wetness.
Fibre	Severe: ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.

See footnote at end of table.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
147B---------------- Shelter	Severe: wetness, percs slowly, large stones.	Severe: large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: large stones, wetness.
147D---------------- Shelter	Severe: wetness, percs slowly, large stones.	Severe: slope, large stones.	Severe: wetness, large stones.	Severe: wetness.	Poor: large stones, wetness.
148B*:					
Longrie------------	Severe: thin layer, seepage.	Severe: seepage, depth to rock.	Severe: depth to rock, seepage.	Moderate: seepage.	Poor: area reclaim, thin layer.
Rock outcrop.					
149B---------------- Kalkaska	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy.
150----------------- Fibre	Severe: ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
151----------------- Beavertail	Severe: ponding, percs slowly.	Severe: excess humus, ponding.	Severe: ponding.	Severe: ponding.	Poor: small stones, ponding.
152----------------- Grousehaven	Severe: ponding, percs slowly.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding.	Poor: hard to pack, ponding.
153*. Dumps					
154F*:					
Dawson-------------	Severe: subsides, ponding, percs slowly.	Severe: seepage, excess humus, ponding.	Severe: seepage, ponding, excess humus.	Severe: seepage, ponding.	Poor: ponding, excess humus.
Deer Park----------	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, slope.
Wainola------------	Severe: wetness, poor filter.	Severe: seepage, wetness.	Severe: seepage, wetness, too sandy.	Severe: seepage, wetness.	Poor: too sandy, wetness.
155B*:					
Allendale----------	Severe: wetness, percs slowly, poor filter.	Severe: seepage.	Severe: wetness, too clayey.	Severe: seepage, wetness.	Poor: too clayey, hard to pack, wetness.

See footnote at end of table.

TABLE 14.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
155B*:					
Posen	Severe: large stones.	Severe: large stones.	Severe: large stones.	Slight	Poor: large stones.
Pickford	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding, too clayey.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
156A*:					
Rockcut	Severe: wetness, percs slowly.	Severe: seepage, wetness, large stones.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
Pinconning	Severe: ponding, percs slowly, poor filter.	Severe: seepage, ponding.	Severe: ponding, too clayey.	Severe: seepage, ponding.	Poor: too clayey, hard to pack, ponding.
159B*:					
Amasa	Severe: poor filter.	Severe: seepage.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
Sugar	Severe: wetness, percs slowly.	Moderate: seepage, slope.	Severe: wetness, too sandy.	Severe: wetness.	Poor: wetness, thin layer.
159F*:					
Amasa	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.
Sugar	Severe: percs slowly, slope.	Severe: slope.	Severe: slope, too sandy.	Severe: slope.	Poor: slope, thin layer.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
10B, 10D Ontonagon	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
10F Ontonagon	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
11A Rudyard	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, too clayey.
12 Pickford	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
13B, 13D Alcona	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
13F Alcona	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, slope.
14A Gaastra	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
15B, 15D Rousseau	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
15E, 15F Rousseau	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, slope.
17D Deer Park	Good	Probable	Improbable: too sandy.	Poor: too sandy.
17F Deer Park	Poor: slope.	Probable	Improbable: too sandy.	Poor: too sandy, slope.
18B, 18D Rubicon	Good	Probable	Improbable: too sandy.	Poor: too sandy.
18E Rubicon	Poor: slope.	Probable	Improbable: too sandy.	Poor: too sandy, slope.
19B, 19D Kalkaska	Good	Probable	Improbable: too sandy.	Poor: too sandy.
19E, 19F Kalkaska	Poor: slope.	Probable	Improbable: too sandy.	Poor: too sandy, slope.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
20A: Croswell	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
21A: Au Gres	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
22: Kinross	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
23: Roscommon	Poor: wetness.	Probable	Improbable: too sandy.	Poor: wetness.
25B, 25D: Guardlake	Fair: large stones.	Probable	Probable	Poor: too sandy, small stones, area reclaim.
27B: Emmet	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
28B: Longrie	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, thin layer.
29A: Solona	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
32A: Allendale	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
33*. Pits				
34. Entisols				
35*: Histosols.				
Aquents.				
36*: Markey	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.
Carbondale	Poor: wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
37*: Dawson	Poor: wetness.	Probable	Probable	Poor: excess humus, wetness.

See footnote at end of table.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
37*:				
Loxley	Poor: wetness, low strength.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness, too acid.
38F*:				
Deer Park	Poor: slope.	Probable	Improbable: too sandy.	Poor: too sandy, slope.
Kinross	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
39D*:				
Au Gres	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Dawson	Poor: wetness.	Probable	Probable	Poor: excess humus, wetness.
Rubicon	Good	Probable	Improbable: too sandy.	Poor: too sandy.
40A*:				
Rudyard	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, too clayey.
Allendale	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
41D*:				
Summerville	Poor: area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, large stones, thin layer.
Rock outcrop.				
41F*:				
Summerville	Poor: area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, large stones, thin layer.
Rock outcrop.				
42D*:				
Emmet	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Kalkaska	Good	Probable	Improbable: too sandy.	Poor: too sandy.

See footnote at end of table.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
44B, 44D-------------- Posen	Poor: large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim.
44E------------------- Posen	Poor: large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
46B, 46D-------------- Pence	Good-----------------	Probable-------------	Probable-------------	Poor: too sandy, small stones, area reclaim.
46E------------------- Pence	Poor: slope.	Probable-------------	Probable-------------	Poor: too sandy, small stones, area reclaim.
48E*:				
Wainola--------------	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
Kinross--------------	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: too sandy, wetness.
Rousseau-------------	Fair: slope.	Probable-------------	Improbable: too sandy.	Poor: too sandy, slope.
49A------------------- Wainola	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
50-------------------- Deford	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
52A------------------- Ingalls	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
53B------------------- Menominee	Good-----------------	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy, small stones.
56A------------------- Ensign	Poor: area reclaim, wetness, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, wetness, thin layer.
57B*:				
Summerville----------	Poor: area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, large stones, thin layer.

See footnote at end of table.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
57B*:				
Longrie	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, thin layer.
61A Halfaday	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
67B*:				
Duel	Poor: area reclaim.	Improbable: thin layer.	Improbable: too sandy.	Poor: too sandy.
Rock outcrop.				
68 Pinconning	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
78B Waiska	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
79B*, 79D*:				
Kalkaska	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Manistee	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
80B Superior	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
83A*:				
Allendale	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
Croswell	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
84B*, 84D*:				
Rousseau	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
Alcona	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
84F*:				
Rousseau	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, slope.
Alcona	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, slope.

See footnote at end of table.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
85B*:				
Kalkaska	Good	Probable	Improbable: too sandy.	Poor: too sandy.
Ocqueoc	Fair: shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
86A*:				
Ingalls	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
Halfaday	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
87B Rousseau	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
88A*:				
Croswell	Fair: wetness.	Probable	Improbable: too sandy.	Poor: too sandy.
Au Gres	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
89A*:				
Kinross	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Au Gres	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
91B, 91D Rousseau	Good	Probable	Improbable: too sandy.	Poor: too sandy.
91E Rousseau	Poor: slope.	Probable	Improbable: too sandy.	Poor: too sandy, slope.
92A Biscuit	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
93F*:				
Ontonagon	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
Pickford	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
94A*:				
Markey	Poor: wetness.	Probable	Improbable: too sandy.	Poor: excess humus, wetness.

See footnote at end of table.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
94A*:				
Kinross	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Au Gres	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
95A Bowers	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
96B*:				
Velvet	Poor: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: area reclaim, large stones.
Westbury	Poor: wetness.	Probable	Probable	Poor: small stones, area reclaim, wetness.
97A Wega	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
98 Ermatinger	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
99A Westbury	Poor: wetness.	Probable	Probable	Poor: small stones, area reclaim, wetness.
101 Chippeny	Poor: area reclaim, wetness.	Improbable: excess humus.	Improbable: excess humus.	Poor: excess humus, wetness.
102*:				
Kinross	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Dawson	Poor: wetness.	Probable	Probable	Poor: excess humus, wetness.
103D*:				
Velvet	Poor: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: area reclaim, large stones.
Rockbottom	Fair: large stones, wetness.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim.
103E*:				
Velvet	Poor: large stones, slope.	Improbable: large stones.	Improbable: large stones.	Poor: area reclaim, large stones, slope.

See footnote at end of table.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
103E*: Rockbottom	Poor: slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim, slope.
104B, 104D Amasa	Good	Probable	Probable	Poor: small stones, area reclaim.
104F Amasa	Poor: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
106A*: Potagannissing	Poor: area reclaim, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, wetness.
Rock outcrop.				
107B Oldman	Poor: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: large stones, area reclaim.
108D*: Shelter	Poor: large stones, wetness.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, large stones, wetness.
Alpena	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
111 Gutport	Poor: depth to rock, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
112 Soo	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
113 Ruse	Poor: depth to rock, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: depth to rock, small stones, wetness.
114B, 114D Velvet	Poor: large stones.	Improbable: large stones.	Improbable: large stones.	Poor: area reclaim, large stones.
116*. Udorthents				

See footnote at end of table.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
117B, 117D------------ Manistee	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
117F------------------ Manistee	Poor: shrink-swell, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, slope.
119------------------- Gogomain	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
121B------------------ Rockbottom	Fair: large stones, wetness.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim.
122*. Pits				
123B------------------ Ocqueoc	Fair: shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
124D------------------ Alpena	Good-----------------	Probable-------------	Probable-------------	Poor: too sandy, small stones, area reclaim.
125B*:				
Croswell-------------	Fair: wetness.	Probable-------------	Improbable: too sandy.	Poor: too sandy.
Markey---------------	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: excess humus, wetness.
126------------------- Pickford	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
127------------------- Gay	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
128F*:				
Alcona---------------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, slope.
Markey---------------	Poor: wetness.	Probable-------------	Improbable: too sandy.	Poor: excess humus, wetness.
129A------------------ Rudyard	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, too clayey.

See footnote at end of table.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
130A*:				
Rudyard	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, too clayey.
Pickford	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
132B Sugar	Fair: thin layer, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
132F Sugar	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, slope.
133 Dora	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness.
135B*:				
Longrie	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, thin layer.
Posen	Poor: large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim.
136A*:				
Westbury	Poor: wetness.	Probable	Probable	Poor: small stones, area reclaim, wetness.
Gay	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
137A*:				
Kinross	Poor: wetness.	Probable	Improbable: too sandy.	Poor: too sandy, wetness.
Wainola	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
138B*:				
Rousseau	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
Urban land.				

See footnote at end of table.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
139A*:				
Rudyard	Poor: low strength, shrink-swell, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness, too clayey.
Urban land.				
143 Burleigh	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
144*:				
Urban land.				
Udorthents.				
145A*:				
Gaastra	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
Gogomain	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
Ingalls	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer, wetness.
146A*:				
Allendale	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
Fibre	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
147B, 147D Shelter	Poor: large stones, wetness.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, large stones, wetness.
148B*:				
Longrie	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones, thin layer.
Rock outcrop.				
149B Kalkaska	Good	Probable	Improbable: too sandy.	Poor: too sandy.
150 Fibre	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.

See footnote at end of table.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
151------------------- Beavertail	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, wetness.
152------------------- Grousehaven	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
153*. Dumps				
154F*:				
Dawson---------------	Poor: wetness.	Probable-------------	Probable-------------	Poor: excess humus, wetness.
Deer Park------------	Poor: slope.	Probable-------------	Improbable: too sandy.	Poor: too sandy, slope.
Wainola--------------	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
155B*:				
Allendale------------	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.
Posen----------------	Poor: large stones.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: large stones, area reclaim.
Pickford-------------	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
156A*:				
Rockcut--------------	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, large stones, wetness.
Pinconning-----------	Poor: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, wetness.
159B*:				
Amasa----------------	Good-----------------	Probable-------------	Probable-------------	Poor: small stones, area reclaim.
Sugar----------------	Fair: thin layer, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy.

See footnote at end of table.

TABLE 15.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
159F*:				
Amasa	Poor: slope.	Probable	Probable	Poor: small stones, area reclaim, slope.
Sugar	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too sandy, slope.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation)

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
10B---------------- Ontonagon	Moderate: slope.	Severe: hard to pack.	Severe: slow refill.	Percs slowly, slope.	Erodes easily, wetness.	Erodes easily, percs slowly.
10D---------------- Ontonagon	Severe: slope.	Severe: hard to pack.	Severe: slow refill.	Percs slowly, slope.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
10F---------------- Ontonagon	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
11A---------------- Rudyard	Slight----------	Severe: wetness, hard to pack.	Severe: no water.	Percs slowly---	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
12----------------- Pickford	Slight----------	Severe: ponding.	Severe: no water.	Ponding, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
13B---------------- Alcona	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Slope, cutbanks cave.	Wetness, too sandy.	Droughty.
13D---------------- Alcona	Severe: slope.	Severe: piping.	Severe: no water.	Slope, cutbanks cave.	Slope, wetness, too sandy.	Slope, droughty.
13F---------------- Alcona	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
14A---------------- Gaastra	Slight----------	Severe: piping.	Severe: no water.	Frost action---	Erodes easily, wetness.	Wetness, erodes easily.
15B---------------- Rousseau	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.
15D, 15E, 15F----- Rousseau	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
17D---------------- Deer Park	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.
17F---------------- Deer Park	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
18B---------------- Rubicon	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.
18D, 18E---------- Rubicon	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
19B Kalkaska	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.
19D, 19E, 19F Kalkaska	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
20A Croswell	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, too sandy.	Droughty.
21A Au Gres	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, too sandy, soil blowing.	Wetness, droughty.
22 Kinross	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, too sandy, soil blowing.	Wetness.
23 Roscommon	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, too sandy, soil blowing.	Wetness, droughty.
25B Guardlake	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Large stones	Large stones.
25D Guardlake	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope.
27B Emmet	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Soil blowing	Rooting depth.
28B Longrie	Moderate: seepage, depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Large stones, depth to rock.	Large stones, droughty.
29A Solona	Moderate: seepage.	Severe: piping, wetness.	Moderate: slow refill.	Frost action	Erodes easily, wetness, soil blowing.	Wetness, erodes easily, droughty.
32A Allendale	Severe: seepage.	Severe: hard to pack, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly	Wetness, soil blowing, percs slowly.	Wetness, droughty, percs slowly.
33*. Pits						
34. Entisols						
35*: Histosols.						
Aquents.						

See footnote at end of table.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
36*:						
Markey-----------	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: slow refill, cutbanks cave.	Ponding, subsides, frost action.	Ponding, too sandy, soil blowing.	Wetness.
Carbondale-------	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill.	Ponding, subsides, frost action.	Ponding, soil blowing.	Wetness.
37*:						
Dawson-----------	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill, cutbanks cave.	Ponding, subsides, frost action.	Ponding--------	Wetness, rooting depth.
Loxley-----------	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill.	Ponding, subsides, frost action.	Ponding--------	Wetness.
38F*:						
Deer Park--------	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
Kinross----------	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, too sandy, soil blowing.	Wetness, droughty.
39D*:						
Au Gres----------	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, too sandy, soil blowing.	Wetness, droughty.
Dawson-----------	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill, cutbanks cave.	Ponding, subsides, frost action.	Ponding--------	Wetness, rooting depth.
Rubicon----------	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.
40A*:						
Rudyard----------	Slight---------	Severe: wetness, hard to pack.	Severe: no water.	Percs slowly---	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Allendale--------	Severe: seepage.	Severe: hard to pack, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly---	Wetness, soil blowing, percs slowly.	Wetness, droughty, percs slowly.
41D*, 41F*:						
Summerville------	Severe: depth to rock, seepage, slope.	Severe: piping, large stones, thin layer.	Severe: no water.	Deep to water	Slope, depth to rock, area reclaim.	Depth to rock, area reclaim.
Rock outcrop.						

See footnote at end of table.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
42D*:						
Emmet------------	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, rooting depth.
Kalkaska---------	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
44B--------------- Posen	Moderate: seepage, slope.	Severe: seepage, piping, large stones.	Severe: no water.	Deep to water	Large stones---	Large stones, droughty.
44D, 44E---------- Posen	Severe: slope.	Severe: seepage, piping, large stones.	Severe: no water.	Deep to water	Slope, large stones.	Large stones, slope, droughty.
46B--------------- Pence	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Soil blowing, too sandy.	Droughty.
46D, 46E---------- Pence	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
48E*:						
Wainola----------	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, too sandy, soil blowing.	Wetness, droughty.
Kinross----------	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, too sandy, soil blowing.	Wetness.
Rousseau---------	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
49A--------------- Wainola	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, too sandy, soil blowing.	Wetness, droughty.
50---------------- Deford	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, too sandy, soil blowing.	Wetness, droughty.
52A--------------- Ingalls	Severe: seepage.	Severe: piping, wetness.	Severe: slow refill, cutbanks cave.	Cutbanks cave	Erodes easily, wetness, soil blowing.	Wetness, erodes easily, droughty.
53B--------------- Menominee	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.

See footnote at end of table.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
56A--------------- Ensign	Severe: depth to rock, seepage.	Severe: piping, wetness.	Severe: depth to rock.	Thin layer, frost action.	Depth to rock, area reclaim, wetness.	Wetness, depth to rock, area reclaim.
57B*:						
Summerville------	Severe: depth to rock, seepage.	Severe: piping, large stones, thin layer.	Severe: no water.	Deep to water	Depth to rock, area reclaim.	Depth to rock, area reclaim.
Longrie----------	Moderate: seepage, depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Large stones, depth to rock.	Large stones, droughty.
61A--------------- Halfaday	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, too sandy, soil blowing.	Droughty.
67B*:						
Duel-------------	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Depth to rock, area reclaim, too sandy.	Droughty, area reclaim, depth to rock.
Rock outcrop.						
68---------------- Pinconning	Severe: seepage.	Severe: ponding.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly.	Ponding, soil blowing, percs slowly.	Wetness, droughty, percs slowly.
78B--------------- Waiska	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.
79B*:						
Kalkaska---------	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.
Manistee---------	Severe: seepage.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, slope.	Wetness, soil blowing, percs slowly.	Droughty, percs slowly.
79D*:						
Kalkaska---------	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
Manistee---------	Severe: seepage, slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Slope, soil blowing, percs slowly.	Slope, droughty, rooting depth.
80B--------------- Superior	Moderate: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Soil blowing, percs slowly.	Droughty, percs slowly.
83A*:						
Allendale--------	Severe: seepage.	Severe: hard to pack, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly---	Wetness, soil blowing, percs slowly.	Wetness, droughty, percs slowly.

See footnote at end of table.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
83A*:						
Croswell----------	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, too sandy.	Droughty.
84B*:						
Rousseau----------	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.
Alcona------------	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Slope, cutbanks cave.	Wetness, too sandy.	Droughty.
84D*:						
Rousseau----------	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
Alcona------------	Severe: slope.	Severe: piping.	Severe: no water.	Slope, cutbanks cave.	Slope, wetness, too sandy.	Slope, droughty.
84F*:						
Rousseau----------	Severe: seepage, slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
Alcona------------	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
85B*:						
Kalkaska----------	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.
Ocqueoc-----------	Severe: seepage.	Severe: piping.	Severe: slow refill, cutbanks cave.	Slope, cutbanks cave.	Wetness, too sandy.	Droughty.
86A*:						
Ingalls-----------	Severe: seepage.	Severe: piping, wetness.	Severe: slow refill, cutbanks cave.	Cutbanks cave	Erodes easily, wetness, soil blowing.	Wetness, erodes easily, droughty.
Halfaday----------	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, too sandy, soil blowing.	Droughty.
87B---------------- Rousseau	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Slope, cutbanks cave.	Wetness, too sandy.	Droughty.
88A*:						
Croswell----------	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Cutbanks cave	Wetness, too sandy.	Droughty.

See footnote at end of table.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
88A*:						
Au Gres----------	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, too sandy, soil blowing.	Wetness, droughty.
89A*:						
Kinross----------	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, too sandy, soil blowing.	Wetness.
Au Gres----------	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, too sandy, soil blowing.	Wetness, droughty.
91B--------------- Rousseau	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.
91D, 91E---------- Rousseau	Severe: seepage, slope.	Severe: seepage, piping.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
92A--------------- Biscuit	Moderate: seepage.	Severe: hard to pack, wetness.	Severe: no water.	Percs slowly, frost action.	Erodes easily, wetness, soil blowing.	Wetness, erodes easily, rooting depth.
93F*:						
Ontonagon--------	Severe: slope.	Severe: hard to pack.	Severe: no water.	Deep to water	Slope, erodes easily, percs slowly.	Slope, erodes easily, percs slowly.
Pickford---------	Slight---------	Severe: hard to pack, ponding.	Severe: no water.	Ponding, percs slowly, flooding.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
94A*:						
Markey-----------	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: slow refill, cutbanks cave.	Ponding, subsides, frost action.	Ponding, too sandy, soil blowing.	Wetness.
Kinross----------	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, too sandy, soil blowing.	Wetness.
Au Gres----------	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, too sandy, soil blowing.	Wetness, droughty.
95A--------------- Bowers	Slight---------	Severe: wetness.	Severe: slow refill.	Percs slowly, frost action.	Wetness, percs slowly.	Wetness, percs slowly.
96B*:						
Velvet-----------	Moderate: slope, seepage.	Severe: seepage, large stones.	Severe: no water.	Percs slowly, large stones, slope.	Large stones, wetness.	Large stones, wetness.

See footnote at end of table.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
96B*:						
Westbury---------	Slight---------	Severe: seepage, piping, large stones.	Severe: no water.	Percs slowly, large stones, frost action.	Large stones, wetness.	Large stones, wetness.
97A--------------- Wega	Slight---------	Severe: piping.	Severe: no water.	Frost action---	Erodes easily, wetness, soil blowing.	Wetness, erodes easily.
98---------------- Ermatinger	Moderate: seepage.	Severe: piping, ponding.	Severe: cutbanks cave.	Ponding, frost action, cutbanks cave.	Erodes easily, ponding.	Wetness, erodes easily, rooting depth.
99A--------------- Westbury	Slight---------	Severe: seepage, piping, large stones.	Severe: no water.	Percs slowly, large stones, frost action.	Large stones, wetness.	Large stones, wetness.
101--------------- Chippeny	Moderate: seepage.	Severe: excess humus, ponding.	Severe: slow refill.	Ponding, thin layer, subsides.	Area reclaim, ponding, soil blowing.	Wetness, area reclaim.
102*:						
Kinross----------	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, soil blowing, too sandy.	Wetness.
Dawson-----------	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill, cutbanks cave.	Ponding, subsides, frost action.	Ponding--------	Wetness, rooting depth.
103D*:						
Velvet-----------	Severe: slope.	Severe: seepage, large stones.	Severe: no water.	Percs slowly, large stones, slope.	Slope, large stones, wetness.	Large stones, wetness, slope.
Rockbottom-------	Severe: slope.	Severe: seepage, large stones.	Severe: no water.	Large stones, slope.	Slope, large stones, erodes easily.	Large stones, slope, erodes easily.
103E*:						
Velvet-----------	Severe: slope.	Severe: seepage, large stones.	Severe: no water.	Deep to water	Slope, large stones, too sandy.	Large stones, slope, droughty.
Rockbottom-------	Severe: slope.	Severe: seepage, large stones.	Severe: no water.	Deep to water	Slope, large stones, erodes easily.	Large stones, slope, erodes easily.
104B-------------- Amasa	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Erodes easily, too sandy.	Erodes easily.
104D, 104F-------- Amasa	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, erodes easily, too sandy.	Slope, erodes easily.
106A*:						
Potagannissing---	Severe: depth to rock, seepage.	Severe: thin layer, wetness.	Severe: no water.	Thin layer, frost action.	Large stones, depth to rock, area reclaim.	Large stones, wetness, depth to rock.

See footnote at end of table.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
106A*: Rock outcrop.						
107B----------------Oldman	Moderate: slope.	Severe: seepage, large stones.	Severe: no water.	Percs slowly, large stones, slope.	Large stones, wetness.	Large stones, wetness.
108D*: Shelter-----------	Moderate: slope.	Severe: piping, large stones, wetness.	Severe: no water.	Percs slowly, large stones, frost action.	Large stones, wetness.	Large stones, wetness.
Alpena-----------	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Too sandy------	Droughty.
111---------------Gutport	Moderate: depth to rock.	Severe: hard to pack, ponding.	Severe: slow refill, depth to rock.	Ponding, percs slowly, depth to rock.	Depth to rock, ponding, soil blowing.	Wetness, depth to rock, percs slowly.
112---------------Soo	Slight---------	Severe: ponding.	Severe: no water.	Ponding, percs slowly, frost action.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
113---------------Ruse	Severe: depth to rock.	Severe: piping, ponding, thin layer.	Severe: depth to rock.	Ponding, depth to rock, frost action.	Depth to rock, ponding, soil blowing.	Wetness, depth to rock.
114B--------------Velvet	Moderate: slope, seepage.	Severe: seepage, large stones.	Severe: no water.	Percs slowly, large stones, slope.	Large stones, wetness.	Large stones, wetness.
114D--------------Velvet	Severe: slope.	Severe: seepage, large stones.	Severe: no water.	Percs slowly, large stones, slope.	Slope, large stones, wetness.	Large stones, wetness, slope.
116*. Udorthents						
117B--------------Manistee	Severe: seepage.	Moderate: hard to pack, wetness.	Severe: no water.	Percs slowly, slope.	Wetness, soil blowing, percs slowly.	Droughty, percs slowly.
117D, 117F--------Manistee	Severe: seepage, slope.	Moderate: hard to pack.	Severe: no water.	Deep to water	Slope, soil blowing, percs slowly.	Slope, droughty, rooting depth.
119---------------Gogomain	Severe: seepage.	Severe: piping, ponding.	Severe: no water.	Ponding, percs slowly, frost action.	Erodes easily, ponding, soil blowing.	Wetness, erodes easily, droughty.
121B--------------Rockbottom	Moderate: seepage, slope.	Severe: seepage, large stones.	Severe: no water.	Large stones, slope.	Large stones, erodes easily.	Large stones, erodes easily.
122*. Pits						

See footnote at end of table.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
123B Ocqueoc	Severe: seepage.	Severe: piping.	Severe: slow refill, cutbanks cave.	Slope, cutbanks cave.	Wetness, too sandy.	Droughty.
124D Alpena	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Too sandy	Droughty.
125B*:						
Croswell	Severe: seepage.	Severe: seepage, piping.	Severe: cutbanks cave.	Slope, cutbanks cave.	Wetness, too sandy.	Droughty.
Markey	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: slow refill, cutbanks cave.	Ponding, subsides, frost action.	Ponding, too sandy, soil blowing.	Wetness.
126 Pickford	Slight	Severe: ponding.	Severe: no water.	Ponding, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
127 Gay	Moderate: seepage.	Severe: ponding.	Moderate: slow refill.	Ponding, frost action.	Ponding	Wetness, droughty, rooting depth.
128F*:						
Alcona	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.
Markey	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: slow refill, cutbanks cave.	Ponding, subsides, frost action.	Ponding, too sandy, soil blowing.	Wetness.
129A Rudyard	Slight	Severe: wetness, hard to pack.	Severe: no water.	Percs slowly	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
130A*:						
Rudyard	Slight	Severe: wetness, hard to pack.	Severe: no water.	Percs slowly	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Pickford	Slight	Severe: ponding.	Severe: no water.	Ponding, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
132B Sugar	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, soil blowing.	Wetness, percs slowly.
132F Sugar	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, percs slowly.
133 Dora	Severe: seepage.	Severe: ponding.	Severe: no water.	Ponding, percs slowly, subsides.	Ponding, soil blowing, percs slowly.	Wetness, percs slowly.

See footnote at end of table.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
135B*:						
Longrie	Moderate: seepage, depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Large stones, depth to rock.	Large stones, droughty.
Posen	Moderate: seepage, slope.	Severe: seepage, piping, large stones.	Severe: no water.	Deep to water	Large stones	Large stones, droughty.
136A*:						
Westbury	Slight	Severe: seepage, piping, large stones.	Severe: no water.	Percs slowly, large stones, frost action.	Large stones, wetness.	Large stones, wetness.
Gay	Moderate: seepage.	Severe: ponding.	Moderate: slow refill.	Ponding, frost action.	Ponding	Wetness, droughty, rooting depth.
137A*:						
Kinross	Severe: seepage.	Severe: seepage, piping, ponding.	Severe: cutbanks cave.	Ponding, cutbanks cave.	Ponding, soil blowing, too sandy.	Wetness.
Wainola	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, too sandy, soil blowing.	Wetness, droughty.
138B*:						
Rousseau	Severe: seepage.	Severe: piping.	Severe: no water.	Deep to water	Too sandy, soil blowing.	Droughty.
Urban land.						
139A*:						
Rudyard	Slight	Severe: wetness, hard to pack.	Severe: no water.	Percs slowly	Erodes easily, wetness, percs slowly.	Wetness, erodes easily, percs slowly.
Urban land.						
143 Burleigh	Severe: seepage.	Severe: piping, ponding.	Severe: slow refill, cutbanks cave.	Ponding, cutbanks cave.	Erodes easily, ponding, soil blowing.	Wetness, erodes easily, droughty.
144*:						
Urban land.						
Udorthents.						
145A*:						
Gaastra	Slight	Severe: piping.	Severe: no water.	Frost action	Erodes easily, wetness.	Wetness, erodes easily.
Gogomain	Severe: seepage.	Severe: piping, ponding.	Severe: no water.	Ponding, percs slowly, frost action.	Erodes easily, ponding, soil blowing.	Wetness, erodes easily, droughty.

See footnote at end of table.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
145A*:						
Ingalls	Severe: seepage.	Severe: piping, wetness.	Severe: slow refill, cutbanks cave.	Cutbanks cave	Erodes easily, wetness, soil blowing.	Wetness, erodes easily droughty.
146A*:						
Allendale	Severe: seepage.	Severe: hard to pack, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly	Wetness, soil blowing, percs slowly.	Wetness, droughty, percs slowly.
Fibre	Slight	Severe: hard to pack, ponding.	Severe: no water.	Ponding, percs slowly, subsides.	Ponding, soil blowing, percs slowly.	Wetness, percs slowly.
147B Shelter	Moderate: slope.	Severe: piping, large stones, wetness.	Severe: no water.	Percs slowly, large stones, frost action.	Large stones, wetness.	Large stones, wetness.
147D Shelter	Severe: slope.	Severe: piping, large stones, wetness.	Severe: no water.	Percs slowly, large stones, frost action.	Slope, large stones, wetness.	Large stones, wetness, slope.
148B*:						
Longrie	Moderate: seepage, depth to rock, slope.	Severe: piping.	Severe: no water.	Deep to water	Large stones, depth to rock.	Large stones.
Rock outcrop.						
149B Kalkaska	Severe: seepage.	Severe: seepage, piping.	Severe: no water.	Deep to water	Too sandy	Droughty.
150 Fibre	Slight	Severe: hard to pack, ponding.	Severe: no water.	Ponding, percs slowly, subsides.	Ponding, soil blowing, percs slowly.	Wetness, percs slowly.
151 Beavertail	Slight	Severe: ponding.	Severe: slow refill.	Ponding, percs slowly, frost action.	Large stones, ponding, soil blowing.	Large stones, wetness, rooting depth
152 Grousehaven	Severe: seepage.	Severe: excess humus, hard to pack, ponding.	Severe: slow refill.	Ponding, percs slowly, frost action.	Ponding, soil blowing, percs slowly.	Wetness, percs slowly.
153*. Dumps						
154F*:						
Dawson	Severe: seepage.	Severe: excess humus, ponding.	Severe: slow refill, cutbanks cave.	Ponding, subsides, frost action.	Ponding	Wetness, rooting depth
Deer Park	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, too sandy, soil blowing.	Slope, droughty.

See footnote at end of table.

TABLE 16.--WATER MANAGEMENT--Continued

Soil name and map symbol	Limitations for--			Features affecting--		
	Pond reservoir areas	Embankments, dikes, and levees	Aquifer-fed excavated ponds	Drainage	Terraces and diversions	Grassed waterways
154F*:						
Wainola----------	Severe: seepage.	Severe: seepage, piping, wetness.	Severe: cutbanks cave.	Cutbanks cave	Wetness, too sandy, soil blowing.	Wetness, droughty.
155B*:						
Allendale--------	Severe: seepage.	Severe: hard to pack, wetness.	Severe: slow refill, cutbanks cave.	Percs slowly---	Wetness, soil blowing, percs slowly.	Wetness, droughty, percs slowly.
Posen------------	Moderate: seepage, slope.	Severe: seepage, piping, large stones.	Severe: no water.	Deep to water	Large stones---	Large stones, droughty.
Pickford---------	Slight---------	Severe: ponding.	Severe: no water.	Ponding, percs slowly.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
156A*:						
Rockcut----------	Slight---------	Severe: piping, wetness.	Severe: slow refill, cutbanks cave.	Frost action---	Large stones, wetness.	Large stones, wetness.
Pinconning-------	Severe: seepage.	Severe: ponding.	Severe: slow refill, cutbanks cave.	Ponding, percs slowly.	Ponding, soil blowing, percs slowly.	Wetness, droughty, percs slowly.
159B*:						
Amasa------------	Severe: seepage.	Severe: seepage.	Severe: no water.	Deep to water	Erodes easily, too sandy.	Erodes easily.
Sugar------------	Moderate: seepage, slope.	Severe: piping.	Severe: no water.	Percs slowly, frost action, slope.	Wetness, soil blowing.	Wetness, percs slowly.
159F*:						
Amasa------------	Severe: seepage, slope.	Severe: seepage.	Severe: no water.	Deep to water	Slope, erodes easily, too sandy.	Slope, erodes easily.
Sugar------------	Severe: slope.	Severe: piping.	Severe: no water.	Deep to water	Slope, soil blowing.	Slope, percs slowly.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 17.--ENGINEERING INDEX PROPERTIES

(The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated)

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
10B, 10D, 10F----	0-7	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	85-95	25-35	5-15
Ontonagon	7-21	Clay-------------	CH	A-7	0	100	100	90-100	75-95	65-90	40-55
	21-60	Clay-------------	CH	A-7	0	100	100	90-100	75-95	65-90	40-55
11A--------------	0-6	Silty clay loam	CL	A-7, A-6	0	100	100	95-100	85-95	35-45	11-20
Rudyard	6-17	Clay-------------	CH	A-7	0	100	100	90-100	75-95	65-90	40-55
	17-60	Clay-------------	CH	A-7	0	100	100	90-100	75-95	65-90	40-55
12---------------	0-8	Silty clay loam	CL	A-7, A-6	0	100	100	90-100	70-95	30-50	10-25
Pickford	8-24	Clay, silty clay, silty clay loam.	CH, CL	A-7	0	100	100	90-100	75-95	40-70	20-40
	24-60	Clay, silty clay	CH, CL	A-7	0	100	100	90-100	75-95	45-70	25-40
13B, 13D, 13F----	0-3	Loamy very fine sand.	SM	A-2-4	0-8	95-100	90-100	70-95	15-35	<25	NP-4
Alcona	3-17	Loamy fine sand, very fine sandy loam, loamy very fine sand.	SM, ML, SC, CL	A-4, A-2-4	0-8	95-100	90-100	55-95	15-65	<30	NP-10
	17-55	Loamy sand, loamy very fine sand, very fine sandy loam.	SM, ML, SC, CL	A-4, A-2-4, A-1-b	0-8	95-100	90-100	35-75	15-65	<30	NP-10
	55-60	Stratified fine sand to silt loam.	SM, ML	A-4, A-2-4	0-8	95-100	90-100	60-95	25-85	<30	NP-7
14A--------------	0-8	Silt loam--------	CL-ML, CL	A-4	0	100	100	85-100	50-90	20-30	5-10
Gaastra	8-41	Silt loam, very fine sandy loam, loamy very fine sand.	ML, CL-ML, SM, SM-SC	A-4	0	100	100	60-100	35-60	<30	NP-10
	41-60	Stratified silt loam to fine sandy loam.	CL-ML, CL, SC, SM-SC	A-4	0	100	100	85-100	40-90	20-30	5-10
15B, 15D, 15E, 15F-------------	0-2	Fine sand--------	SM	A-2-4	0	100	100	65-80	20-35	---	NP
Rousseau	2-17	Fine sand--------	SM	A-2-4	0	100	100	65-80	20-25	---	NP
	17-60	Fine sand--------	SM	A-2-4	0	100	100	65-80	20-25	---	NP
17D, 17F---------	0-8	Fine sand--------	SM	A-2	0	100	100	65-80	20-35	---	NP
Deer Park	8-51	Fine sand, sand	SM, SP-SM	A-2, A-3	0	100	100	50-80	5-30	---	NP
	51-60	Sand-------------	SP-SM, SM	A-2, A-3	0	100	100	50-80	5-30	---	NP
18B, 18D, 18E----	0-3	Sand-------------	SM, SP-SM, SP	A-2, A-3, A-1	0	95-100	75-100	35-70	0-15	---	NP
Rubicon	3-20	Sand-------------	SM, SP-SM, SP	A-2, A-3, A-1	0	95-100	75-100	35-70	0-15	---	NP
	20-60	Sand-------------	SP, SP-SM, SM	A-1, A-2, A-3	0	95-100	75-100	30-70	0-15	---	NP

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
19B, 19D, 19E, 19F------------- Kalkaska	0-7	Sand-------------	SM, SP-SM	A-1, A-2, A-3	0	95-100	90-100	45-70	5-15	---	NP
	7-9	Sand, loamy sand	SM, SP-SM	A-1, A-2, A-3	0	95-100	90-100	45-75	5-30	---	NP
	9-25	Sand-------------	SM, SP-SM	A-1, A-2, A-3	0	95-100	90-100	45-70	5-15	---	NP
	25-60	Sand-------------	SP, SP-SM, SM	A-1, A-2, A-3	0	100	95-100	45-70	0-15	---	NP
20A-------------- Croswell	0-2	Sand-------------	SP-SM, SM	A-3, A-2-4, A-1-b	0	90-100	85-100	40-70	5-15	---	NP
	2-60	Sand-------------	SP-SM, SM, SP	A-3, A-2-4, A-1-b	0	90-100	85-100	40-70	3-15	---	NP
21A-------------- Au Gres	0-5	Sand-------------	SM, SP-SM	A-2-4, A-3, A-1-b	0	95-100	85-100	40-65	5-15	---	NP
	5-60	Sand-------------	SP-SM, SM	A-3, A-2-4, A-1-b	0	95-100	85-100	40-60	5-15	---	NP
22--------------- Kinross	0-10	Sapric material	PT	A-8	0	---	---	---	---	---	NP
	10-42	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	50-80	5-30	---	NP
	42-60	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	50-80	5-30	---	NP
23--------------- Roscommon	0-9	Sapric material	PT	A-8	0	---	---	---	---	---	---
	9-60	Sand, loamy sand	SP, SP-SM, SM	A-1, A-2, A-3	0	95-100	85-100	40-75	0-30	<20	NP-4
25B, 25D--------- Guardlake	0-5	Loam-------------	ML, CL-ML, CL	A-4	0-10	85-100	75-100	65-95	50-75	<25	3-10
	5-16	Very cobbly sandy loam, gravelly fine sandy loam, very gravelly sandy loam.	SM, SM-SC	A-4, A-2-4, A-1	30-55	75-80	35-75	25-70	20-50	<25	NP-6
	16-60	Very gravelly coarse sand, very cobbly sand.	SW-SM, SW, GW, GP-GM	A-1, A-2-4	15-40	40-90	35-50	25-45	0-10	---	NP
27B-------------- Emmet	0-6	Sandy loam-------	SM, SM-SC, SC	A-2, A-1-b, A-4	0-8	90-100	75-100	45-85	20-50	<25	NP-10
	6-14	Sandy loam, loamy sand.	SM, SC, ML, CL	A-2, A-1-b, A-4	0-8	95-100	75-100	35-85	10-55	<25	NP-10
	14-29	Sandy loam, fine sandy loam.	SM-SC, CL, CL-ML, SC	A-2, A-4, A-6, A-1-b	0-8	95-100	75-100	45-95	20-75	20-40	5-20
	29-60	Sandy loam, fine sandy loam.	SM, SM-SC, SC	A-2, A-4, A-1-b	0-8	95-100	75-100	45-80	20-50	<25	NP-10

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
28B-------------- Longrie	0-9	Sandy loam-------	SM, SM-SC	A-2-4, A-4	0-25	95-100	85-100	50-85	25-50	<25	NP-7
	9-27	Loam, fine sandy loam, gravelly silt loam.	SM-SC, CL-ML, CL, SC	A-2-4, A-4, A-1-b	0-25	95-100	75-95	45-95	20-75	20-30	4-10
	27-31	Loam, fine sandy loam, gravelly loam.	SM-SC, SC, CL, CL-ML	A-4, A-2-4, A-1-b	0-25	95-100	75-90	45-90	20-70	20-30	4-10
	31-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
29A-------------- Solona	0-3	Fine sandy loam	SM, SM-SC	A-4, A-2	0-3	80-100	75-100	45-85	25-50	<20	2-7
	3-20	Fine sandy loam, sandy loam, loam.	CL, ML, SC, SM	A-2, A-4	0-3	80-100	75-100	45-100	25-80	20-30	3-10
	20-60	Loam, sandy loam, gravelly fine sandy loam.	ML, CL, SM, SC	A-2, A-4, A-1	0-3	75-100	60-100	35-95	20-75	<25	NP-10
32A-------------- Allendale	0-5	Loamy fine sand	SM, SP-SM	A-2-4, A-1-b, A-4	0	95-100	90-100	45-80	10-40	---	NP
	5-31	Fine sand, sand, loamy fine sand.	SM, SP-SM	A-2-4, A-3, A-4, A-1-b	0	95-100	90-100	45-80	5-40	---	NP
	31-60	Silty clay, clay	CH, MH	A-7	0	100	90-100	90-100	75-95	50-70	20-40
33*. Pits											
34. Entisols											
35*: Histosols.											
Aquents.											
36*: Markey----------	0-33	Sapric material, hemic material.	PT	A-8	---	---	---	---	---	---	---
	33-60	Sand, loamy sand	SP, SM, SP-SM	A-2, A-3, A-1	0	95-100	75-100	35-75	0-30	---	NP
Carbondale------	0-14	Sapric material	PT	A-8	0	---	---	---	---	---	---
	14-33	Sapric material	PT	A-8	0	---	---	---	---	---	---
	33-60	Hemic material---	PT	A-8	0	---	---	---	---	---	---
37*: Dawson----------	0-6	Fibric material	PT	A-8	0	---	---	---	---	---	---
	6-18	Sapric material	PT	A-8	0	---	---	---	---	---	---
	18-60	Sand, fine sand, loamy fine sand.	SM, SP-SM	A-2, A-3,	0	100	100	50-80	5-30	---	NP
Loxley----------	0-10	Fibric material	PT	A-8	0	---	---	---	---	---	---
	10-60	Sapric material	PT	A-8	0	---	---	---	---	---	---

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
38F*:											
Deer Park--------	0-8	Fine sand--------	SM	A-2	0	100	100	65-80	20-35	---	NP
	8-51	Fine sand, sand	SM, SP-SM	A-2, A-3	0	100	100	50-80	5-30	---	NP
	51-60	Sand-------------	SP-SM, SM	A-2, A-3	0	100	100	50-80	5-30	---	NP
Kinross----------	0-10	Mucky sand-------	SP-SM, SM	A-3, A-2-4	0	100	100	50-80	5-35	---	NP
	10-42	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	50-80	5-30	---	NP
	42-60	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	50-80	5-30	---	NP
39D*:											
Au Gres----------	0-5	Sand-------------	SM, SP-SM	A-2-4, A-3, A-1-b	0	95-100	85-100	40-65	5-15	---	NP
	5-60	Sand-------------	SP-SM, SM	A-3, A-2-4, A-1-b	0	95-100	85-100	40-60	5-15	---	NP
Dawson-----------	0-6	Fibric material	PT	A-8	0	---	---	---	---	---	---
	6-18	Sapric material	PT	A-8	0	---	---	---	---	---	---
	18-60	Sand, fine sand, loamy fine sand.	SM, SP-SM	A-2, A-3	0	100	100	50-80	5-30	---	NP
Rubicon----------	0-3	Sand-------------	SM, SP-SM, SP	A-2, A-3, A-1	0	95-100	75-100	35-70	0-15	---	NP
	3-20	Sand-------------	SM, SP-SM, SP	A-2, A-3, A-1	0	95-100	75-100	35-70	0-15	---	NP
	20-60	Sand-------------	SP, SP-SM, SM	A-1, A-2, A-3	0	95-100	75-100	30-70	0-15	---	NP
40A*:											
Rudyard----------	0-6	Silty clay loam	CL	A-7, A-6	0	100	100	95-100	85-95	35-45	11-20
	6-17	Clay-------------	CH	A-7	0	100	100	90-100	75-95	65-90	40-55
	17-60	Clay-------------	CH	A-7	0	100	100	90-100	75-95	65-90	40-55
Allendale--------	0-5	Loamy fine sand	SM, SP-SM	A-2-4, A-1-b, A-4	0	95-100	90-100	45-80	10-40	---	NP
	5-31	Fine sand, sand, loamy fine sand.	SM, SP-SM	A-2-4, A-3, A-4, A-1-b	0	95-100	90-100	45-80	5-40	---	NP
	31-60	Silty clay, clay	CH, MH	A-7	0	100	90-100	90-100	75-95	50-70	20-40
41D*, 41F*:											
Summerville------	0-3	Loam-------------	CL	A-4, A-6	0-10	95-100	90-100	75-95	55-75	25-35	7-15
	3-13	Very fine sandy loam, sandy loam, cobbly loam.	SM-SC, SC, CL, CL-ML	A-2-4, A-4, A-2-6, A-6	0-15	95-100	70-100	35-85	25-75	20-35	4-15
	13-17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
42D*:											
Emmet-----------	0-6	Sandy loam-------	SM, SM-SC, SC	A-2, A-1-b, A-4	0-8	90-100	75-100	45-85	20-50	<25	NP-10
	6-14	Sandy loam, loamy sand.	SM, SC, ML, CL	A-2, A-1-b, A-4	0-8	95-100	75-100	35-85	10-55	<25	NP-10
	14-29	Loam, sandy loam	SM-SC, CL, CL-ML, SC	A-2, A-4, A-6, A-1-b	0-8	95-100	75-100	45-95	20-75	20-40	5-20
	29-60	Sandy loam, fine sandy loam.	SM, SM-SC, SC	A-2, A-4, A-1-b	0-8	95-100	75-100	45-80	20-50	<25	NP-10
Kalkaska--------	0-7	Sand-------------	SM, SP-SM	A-1, A-2, A-3	0	95-100	90-100	45-70	5-15	---	NP
	7-9	Sand, loamy sand	SM, SP-SM	A-1, A-2, A-3	0	95-100	90-100	45-75	5-30	---	NP
	9-25	Sand-------------	SM, SP-SM	A-1, A-2, A-3	0	95-100	90-100	45-70	5-15	---	NP
	25-60	Sand-------------	SP, SP-SM, SM	A-1, A-2, A-3	0	100	95-100	45-70	0-15	---	NP
44B, 44D, 44E---- Posen	0-3	Stony fine sandy loam.	SM, SC, SM-SC	A-4, A-2, A-1-b	20-45	85-100	75-90	35-90	15-50	<30	NP-10
	3-16	Very gravelly loam, very cobbly silt loam, stony silt loam.	ML, CL, SM, SC	A-2, A-4, A-1-b	20-60	80-100	45-85	35-80	15-65	<30	NP-10
	16-60	Very cobbly fine sandy loam, very gravelly fine sandy loam, very cobbly loam.	ML, CL, SM, SC	A-2, A-4, A-1-b	20-60	90-100	45-85	35-70	15-55	<30	NP-10
46B, 46D, 46E---- Pence	0-4	Loamy sand-------	SM, SP-SM	A-1, A-2	0-7	80-100	75-100	35-70	12-30	---	NP
	4-17	Sandy loam, fine sandy loam, gravelly sandy loam.	SM, ML, CL-ML, SM-SC	A-4, A-2, A-1	0-7	55-100	50-100	30-95	15-75	<25	NP-7
	17-28	Gravelly coarse sand, loamy sand, sand.	SM, SP-SM, GM, GP-GM	A-2, A-1, A-3	0-8	55-100	50-100	25-75	2-30	---	NP
	28-60	Gravelly coarse sand, sand, sand and gravel.	SP, SP-SM, GP, GP-GM	A-1, A-3, A-2	0-15	30-100	25-100	10-70	1-12	---	NP
48E*:											
Wainola---------	0-5	Fine sand--------	SM	A-2-4	0	100	90-100	60-80	15-35	---	NP
	5-24	Fine sand, loamy fine sand.	SM, ML	A-2-4, A-4	0	100	90-100	50-80	15-55	---	NP
	24-60	Fine sand, loamy fine sand.	SM, ML	A-2-4, A-4	0	100	90-100	50-80	15-55	---	NP
Kinross---------	0-10	Sapric material	PT	A-8	0	---	---	---	---	---	NP
	10-42	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	50-80	5-30	---	NP
	42-60	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	50-80	5-30	---	NP

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
48E*:											
Rousseau--------	0-19	Fine sand--------	SM	A-2-4	0	100	100	65-80	20-35	---	NP
	19-21	Fine sand--------	SM	A-2-4	0	100	100	65-100	20-35	---	NP
	21-60	Fine sand, sand	SP-SM, SM	A-2-4, A-3	0	100	100	50-100	5-35	---	NP
49A-------------- Wainola	0-5	Fine sand--------	SM	A-2-4	0	100	90-100	60-80	15-35	---	NP
	5-24	Fine sand, loamy fine sand.	SM, ML	A-2-4, A-4	0	100	90-100	50-80	15-55	---	NP
	24-60	Fine sand, loamy fine sand.	SM, ML	A-2-4, A-4	0	100	90-100	50-80	15-55	---	NP
50--------------- Deford	0-4	Fine sand--------	SM	A-2-4	0	100	100	65-80	20-35	<20	NP-4
	4-60	Fine sand, loamy fine sand.	SM	A-2-4, A-4	0	100	100	50-80	15-40	<20	NP-4
52A-------------- Ingalls	0-7	Loamy sand-------	SM, SP-SM	A-2, A-1	0-8	90-100	85-100	40-80	10-35	---	NP
	7-40	Loamy sand, sand, loamy fine sand.	SM, SP-SM	A-2, A-3, A-1	0-8	90-100	85-100	40-80	5-35	---	NP
	40-60	Stratified silt to loamy fine sand.	CL, CL-ML, SC, SM-SC	A-6, A-4	0	95-100	90-100	65-100	45-95	20-35	4-15
53B-------------- Menominee	0-11	Loamy sand-------	SM	A-2-4	0-8	95-100	95-100	50-75	15-30	---	NP
	11-28	Sand, loamy sand, fine sand.	SP, SM, SP-SM	A-2-4, A-3, A-1-b	0-8	95-100	95-100	30-75	5-30	---	NP
	28-34	Clay loam, loam, silty clay loam.	CL, CL-ML	A-4, A-6	0-10	85-95	85-95	80-95	60-90	25-40	5-20
	34-60	Clay loam, sandy clay loam, sandy loam.	CL, CL-ML, SC, SM-SC	A-4, A-6, A-1, A-2	0-10	95-100	75-95	45-95	20-80	25-40	5-20
56A-------------- Ensign	0-4	Silt loam--------	CL-ML, CL	A-4	0-5	90-100	75-100	65-95	50-90	20-30	5-10
	4-13	Loam, silt loam, gravelly fine sandy loam.	CL-ML, CL, SC, SM-SC	A-2-4, A-4, A-6, A-2-6	0-5	90-100	60-100	45-95	25-75	20-35	5-15
	13-17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
57B*:											
Summerville-----	0-3	Loam-------------	CL	A-4, A-6	0-10	95-100	90-100	75-95	55-75	25-35	7-15
	3-13	Very fine sandy loam, sandy loam, cobbly loam.	SM-SC, SC, CL, CL-ML	A-2-4, A-4, A-2-6, A-6	0-15	95-100	70-100	35-85	25-75	20-35	4-15
	13-17	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Longrie---------	0-9	Sandy loam-------	SM, SM-SC	A-2-4, A-4	0-25	95-100	85-100	50-85	25-50	<25	NP-7
	9-27	Loam, fine sandy loam, gravelly silt loam.	SM-SC, CL-ML, CL, SC	A-2-4, A-4, A-1-b	0-25	95-100	75-95	45-95	20-75	20-30	4-10
	27-31	Loam, fine sandy loam, gravelly loam.	SM-SC, SC, CL, CL-ML	A-4, A-2-4, A-1-b	0-25	95-100	75-90	45-90	20-70	20-30	4-10
	31-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments > 3 inches	Percentage passing sieve number--: 4	Percentage passing sieve number--: 10	Percentage passing sieve number--: 40	Percentage passing sieve number--: 200	Liquid limit	Plasticity index
	In				Pct					Pct	
61A Halfaday	0-7	Sand	SM, SP-SM	A-1, A-2, A-3	0	95-100	90-100	40-70	5-15	---	NP
	7-37	Sand	SM, SP-SM	A-1, A-2, A-3	0	95-100	90-100	40-75	5-15	---	NP
	37-60	Sand	SP-SM, SP	A-1, A-2, A-3	0	100	95-100	40-80	0-10	---	NP
67B*:											
Duel	0-9	Sand	SP-SM, SM	A-3, A-2-4, A-1-b	0	95-100	95-100	45-70	5-15	---	NP
	9-30	Sand, loamy sand, loamy coarse sand.	SP-SM, SM, SM-SC	A-3, A-2-4, A-1-b	0	95-100	95-100	45-75	5-30	<20	NP-5
	30-38	Very gravelly very fine sandy loam, very gravelly sandy loam, very gravelly fine sandy loam.	SM, CL, SP-SM, SM-SC	A-2, A-4, A-1, A-7	0	80-95	30-50	30-90	10-75	<45	NP-20
	38-42	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
68 Pinconning	0-8	Mucky loamy sand	SM	A-2-4	0	100	95-100	50-75	15-30	---	NP
	8-21	Sand, loamy sand, fine sand.	SP-SM, SM	A-3, A-2-4	0	100	95-100	50-80	5-35	---	NP
	21-60	Clay, silty clay	CH, CL	A-7	0	100	95-100	90-100	75-95	40-60	25-35
78B Waiska	0-8	Sandy loam	SM, SM-SC, GM-GC	A-2, A-4, A-1-b	0-5	60-95	55-90	35-65	15-40	<25	NP-7
	8-31	Gravelly sandy loam, very gravelly loamy coarse sand, gravelly sand.	SP-SM, GM, SM, SM-SC	A-1, A-3, A-2	8-15	30-80	25-75	15-55	5-35	<20	NP-6
	31-60	Very gravelly coarse sand, extremely gravelly sand.	SP, GP, GP-GM, SP-SM	A-1	8-15	20-60	15-50	10-45	0-15	---	NP
79B*, 79D*:											
Kalkaska	0-7	Sand	SM, SP-SM	A-1, A-2, A-3	0	95-100	90-100	45-70	5-15	---	NP
	7-9	Sand, loamy sand	SM, SP-SM	A-1, A-2, A-3	0	95-100	90-100	45-75	5-30	---	NP
	9-25	Sand	SM, SP-SM	A-1, A-2, A-3	0	95-100	90-100	45-70	5-15	---	NP
	25-60	Sand	SP, SP-SM, SM	A-1, A-2, A-3	0	100	95-100	45-70	0-15	---	NP

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
79B*, 79D*:											
Manistee--------	0-9	Sand-------------	SP-SM, SM	A-3, A-2-4, A-1-b	0-2	95-100	90-100	45-80	5-35	---	NP
	9-21	Sand, loamy sand, fine sand.	SP-SM, SM	A-2-4, A-1-b, A-3	0-2	95-100	90-100	45-80	5-35	---	NP
	21-35	Clay, silty clay	CH, CL	A-7	0	100	100	90-100	80-95	45-65	25-40
	35-60	Clay, silty clay, silty clay loam.	CH, CL	A-7	0	100	100	90-100	85-95	45-65	20-40
80B-------------- Superior	0-2	Fine sandy loam	SM, SM-SC, ML, CL-ML	A-2, A-4	0	90-100	90-100	55-85	25-55	<20	2-7
	2-14	Sandy loam, fine sandy loam, loam.	SC, SM-SC, CL, CL-ML	A-2, A-4	0	90-100	90-100	55-95	25-75	21-28	4-9
	14-36	Clay, silty clay	CH	A-7	0	90-100	90-100	80-100	70-95	50-70	25-45
	36-60	Clay, silty clay	CH	A-7	0	90-100	90-100	80-100	70-95	50-70	25-45
83A*:											
Allendale-------	0-5	Loamy fine sand	SM, SP-SM	A-2-4, A-1-b, A-4	0	95-100	90-100	45-80	10-40	---	NP
	5-31	Fine sand, sand, loamy fine sand.	SM, SP-SM	A-2-4, A-3, A-4, A-1-b	0	95-100	90-100	45-80	5-40	---	NP
	31-60	Silty clay, clay	CH, MH	A-7	0	100	90-100	90-100	75-95	50-70	20-40
Croswell--------	0-2	Sand-------------	SP-SM, SM	A-3, A-2-4, A-1-b	0	90-100	85-100	40-70	5-15	---	NP
	2-60	Sand-------------	SP-SM, SM, SP	A-3, A-2-4, A-1-b	0	90-100	85-100	40-70	3-15	---	NP
84B*, 84D*, 84F*:											
Rousseau--------	0-2	Fine sand--------	SM	A-2-4	0	100	100	65-80	20-35	---	NP
	2-17	Fine sand--------	SM	A-2-4	0	100	100	65-80	20-25	---	NP
	17-60	Fine sand--------	SM	A-2-4	0	100	100	65-80	20-25	---	NP
Alcona----------	0-3	Loamy very fine sand.	SM	A-2-4	0-8	95-100	90-100	70-95	15-35	<25	NP-4
	3-17	Loamy fine sand, very fine sandy loam, loamy very fine sand.	SM, ML, SC, CL	A-4, A-2-4	0-8	95-100	90-100	55-95	15-65	<30	NP-10
	17-55	Loamy sand, loamy very fine sand, very fine sandy loam.	SM, ML, SC, CL	A-4, A-2-4	0-8	95-100	90-100	35-75	15-65	<30	NP-10
	55-60	Stratified fine sand to silt loam.	SM, ML	A-4, A-2-4	0-8	95-100	90-100	60-95	25-85	<30	NP-7

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
85B*:											
Kalkaska	0-7	Sand	SM, SP-SM	A-1, A-2, A-3	0	95-100	90-100	45-70	5-15	---	NP
	7-9	Sand, loamy sand	SM, SP-SM	A-1, A-2, A-3	0	95-100	90-100	45-75	5-30	---	NP
	9-25	Sand	SM, SP-SM	A-1, A-2, A-3	0	95-100	90-100	45-70	5-15	---	NP
	25-60	Sand	SP, SP-SM, SM	A-1, A-2, A-3	0	100	95-100	45-70	0-15	---	NP
Ocqueoc	0-8	Fine sand	SM, SP-SM	A-3, A-2	0	100	100	50-80	5-15	<20	NP-4
	8-22	Sand, loamy fine sand, fine sand.	SM, SP-SM, SM-SC	A-3, A-2	0	100	100	50-80	5-30	<25	NP-4
	22-60	Stratified fine sand to silt loam.	SM-SC, CL-ML, CL, SC	A-6, A-4, A-2	0	100	100	65-95	20-85	20-40	4-20
86A*:											
Ingalls	0-7	Loamy sand	SM, SP-SM	A-2, A-1	0-8	90-100	85-100	40-80	10-35	---	NP
	7-40	Loamy sand, sand, loamy fine sand.	SM, SP-SM	A-2, A-3, A-1	0-8	90-100	85-100	40-80	5-35	---	NP
	40-60	Stratified silt to loamy fine sand.	CL, CL-ML, SC, SM-SC	A-6, A-4	0	95-100	90-100	65-100	45-95	20-35	4-15
Halfaday	0-7	Sand	SM, SP-SM	A-1, A-2, A-3	0	95-100	90-100	40-70	5-15	---	NP
	7-30	Sand	SM, SP-SM	A-1, A-2, A-3	0	95-100	90-100	40-75	5-15	---	NP
	30-60	Sand	SP-SM, SP	A-1, A-2, A-3	0	100	95-100	40-80	0-10	---	NP
87B Rousseau	0-3	Fine sand	SM	A-2-4	0	100	100	65-80	20-35	---	NP
	3-25	Fine sand, loamy fine sand.	SM	A-2-4	0	100	100	65-100	20-35	---	NP
	25-60	Fine sand, sand	SP-SM, SM	A-2-4, A-3	0	100	100	85-100	5-35	---	NP
88A*:											
Croswell	0-2	Sand	SP-SM, SM	A-3, A-2-4, A-1-b	0	90-100	85-100	40-70	5-15	---	NP
	2-60	Sand	SP-SM, SM, SP	A-3, A-2-4, A-1-b	0	90-100	85-100	40-70	3-15	---	NP
Au Gres	0-5	Sand	SM, SP-SM	A-2-4, A-3, A-1-b	0	95-100	85-100	40-65	5-15	---	NP
	5-60	Sand	SP-SM, SM	A-3, A-2-4, A-1-b	0	95-100	85-100	40-60	5-15	---	NP
89A*:											
Kinross	0-5	Sapric material	PT	A-8	0	---	---	---	---	---	NP
	5-42	Sand, loamy sand, fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	50-80	5-30	---	NP
	42-60	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	50-80	5-30	---	NP

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
89A*:											
Au Gres---------	0-5	Sand-------------	SM, SP-SM	A-2-4, A-3, A-1-b	0	95-100	85-100	40-65	5-15	---	NP
	5-60	Sand-------------	SP-SM, SM	A-3, A-2-4, A-1-b	0	95-100	85-100	40-60	5-15	---	NP
91B, 91D, 91E---- Rousseau	0-4	Fine sand--------	SM	A-2-4	0	100	100	65-80	20-35	---	NP
	4-26	Fine sand--------	SM	A-2-4	0	100	100	65-100	20-35	---	NP
	26-60	Fine sand, sand	SP-SM, SM	A-2-4, A-3	0	100	100	50-100	5-35	---	NP
92A-------------- Biscuit	0-11	Very fine sandy loam.	SM, ML, SM-SC	A-4	0	100	100	85-95	40-65	<20	NP-4
	11-16	Very fine sandy loam, loamy very fine sand, very fine sand.	SM, ML, SM-SC	A-2-4, A-4	0	100	100	50-100	25-65	<28	NP-9
	16-22	Silt loam, very fine sandy loam, loamy very fine sand.	SM, ML, CL-ML, SM-SC	A-4	0	100	100	85-100	40-90	<28	NP-9
	22-31	Clay, silty clay, silty clay loam.	CH, CL	A-7	0	100	100	80-100	75-95	45-70	20-45
	31-60	Clay, silty clay	CH, CL	A-7	0	100	100	80-100	75-95	45-70	25-45
93F*:											
Ontonagon-------	0-7	Silt loam--------	CL-ML, CL	A-4, A-6	0	100	100	95-100	85-95	25-35	5-15
	7-21	Clay-------------	CH	A-7	0	100	100	90-100	75-95	65-90	40-55
	21-60	Clay-------------	CH	A-7	0	100	100	90-100	75-95	65-90	40-55
Pickford--------	0-8	Silty clay loam	CL	A-7	0	100	100	90-100	75-95	40-50	20-30
	8-24	Clay, silty clay	CH, CL	A-7	0	100	100	90-100	75-95	40-70	20-45
	24-60	Clay, silty clay	CH, CL	A-7	0	100	100	90-100	75-95	40-70	25-45
94A*:											
Markey----------	0-33	Sapric material	PT	A-8	---	---	---	---	---	---	---
	33-60	Sand, loamy sand	SP, SM, SP-SM	A-2, A-3, A-1	0	95-100	75-100	35-75	0-30	---	NP
Kinross---------	0-5	Sapric material	PT	A-8	0	---	---	---	---	---	NP
	5-42	Sand, loamy sand	SP-SM, SM	A-3, A-2-4	0	100	100	50-80	5-30	---	NP
	42-60	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	50-80	5-30	---	NP
Au Gres---------	0-5	Sand-------------	SM, SP-SM	A-2-4, A-3, A-1-b	0	95-100	85-100	40-65	5-15	---	NP
	5-60	Sand-------------	SP-SM, SM	A-3, A-2-4, A-1-b	0	95-100	85-100	40-60	5-15	---	NP
95A-------------- Bowers	0-8	Silt loam--------	CL	A-6, A-4	0	100	100	85-100	60-90	25-40	7-16
	8-16	Silty clay loam	CL	A-7	0	100	100	90-100	70-95	40-50	20-25
	16-60	Stratified silt loam to silty clay.	CL	A-6, A-7	0	100	100	85-100	60-95	25-50	10-25

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
96B*:											
Velvet	0-3	Very stony loamy sand.	SM, SP-SM	A-2, A-3, A-1	25-55	80-85	70-80	35-70	5-35	<21	NP-4
	3-16	Very cobbly loamy sand, cobbly loamy fine sand, very stony loamy sand.	SM, SP-SM	A-2, A-3, A-1	25-55	65-85	50-75	25-70	5-35	<21	NP-4
	16-41	Gravelly loamy sand, very gravelly very fine sandy loam, very cobbly loamy sand.	SM, SM-SC, SP-SM	A-2, A-4, A-1, A-3	15-55	65-85	50-75	25-70	5-45	<25	NP-7
	41-60	Gravelly fine sandy loam, gravelly loamy fine sand, very cobbly loamy sand.	SM, SM-SC, SP-SM	A-2, A-4, A-1, A-3	15-55	65-85	50-75	25-70	5-45	<25	NP-7
Westbury	0-1	Stony fine sandy loam.	SM, ML, GM	A-2, A-4, A-1	5-25	55-80	50-75	30-75	15-70	<15	NP-4
	1-13	Gravelly silt loam, gravelly fine sandy loam.	SM, GM, ML	A-2, A-4, A-1	0-40	55-95	50-90	30-90	15-80	<15	NP-4
	13-45	Gravelly sandy loam, very gravelly sandy loam, gravelly loam.	SM, GM, GW-GM, ML	A-1, A-2, A-4	0-40	40-90	35-85	20-80	10-65	<15	NP-4
	45-60	Gravelly sandy loam, very gravelly sandy loam, gravelly loam.	GM, GW-GM, SM, ML	A-1, A-2, A-4	0-40	40-90	35-85	20-80	10-65	<15	NP-4
97A Wega	0-9	Very fine sandy loam.	ML	A-4	0	100	100	85-95	50-65	<20	NP-4
	9-60	Stratified silt loam to loamy very fine sand.	ML, CL-ML, SM, SM-SC	A-4	0	100	100	85-100	40-100	<25	NP-7
98 Ermatinger	0-8	Silt loam	ML, CL-ML, CL	A-4	0	100	100	85-100	50-90	<25	NP-10
	8-12	Silt loam, very fine sandy loam, loamy very fine sand.	ML	A-4	0	100	100	90-100	70-90	<35	2-10
	12-21	Very fine sandy loam, loamy very fine sand.	SM, ML, SC, CL	A-4	0	100	100	85-100	40-65	<30	NP-10
	21-60	Very fine sandy loam, loamy very fine sand, silt loam.	SM, ML, CL, ML	A-4, A-6	0	100	100	85-100	40-90	<30	NP-12

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
99A-------------- Westbury	0-1	Stony fine sandy loam.	SM, ML, GM	A-2, A-4, A-1	5-25	55-80	50-75	30-75	15-70	<15	NP-4
	1-13	Gravelly silt loam, gravelly fine sandy loam.	SM, GM, ML	A-2, A-4, A-1	0-40	55-95	50-90	30-90	15-80	<15	NP-4
	13-45	Gravelly sandy loam, very gravelly sandy loam, gravelly loam.	SM, GM, GW-GM, ML	A-1, A-2, A-4	0-40	40-90	35-85	20-80	10-65	<15	NP-4
	45-60	Gravelly sandy loam, very gravelly sandy loam, gravelly loam.	GM, GW-GM, SM, ML	A-1, A-2, A-4	0-40	40-90	35-85	20-80	10-65	<15	NP-4
101-------------- Chippeny	0-25	Sapric material	PT	---	---	---	---	---	---	---	---
	25-35	Sandy loam, silt loam, very gravelly sandy loam.	SM-SC, CL-ML, GM-GC, SM	A-2, A-4, A-6, A-1-a	0-30	45-100	35-100	20-100	5-90	<50	NP-30
	35-39	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
102*:											
Kinross----------	0-5	Sapric material	PT	A-8	0	---	---	---	---	---	NP
	5-42	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	50-80	5-30	---	NP
	42-60	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	50-80	5-30	---	NP
Dawson----------	0-6	Fibric material	PT	A-8	0	---	---	---	---	---	---
	6-18	Sapric material	PT	A-8	0	---	---	---	---	---	---
	18-60	Sand, fine sand	SM, SP-SM	A-2, A-3	0	100	100	50-80	5-30	---	NP
103D*:											
Velvet----------	0-3	Very stony loamy sand.	SM, SP-SM	A-2, A-3, A-1	25-55	80-85	70-80	35-70	5-35	<21	NP-4
	3-16	Very cobbly loamy sand, cobbly loamy fine sand, very stony loamy sand.	SM, SP-SM	A-2, A-3, A-1	25-55	65-85	50-75	25-70	5-35	<21	NP-4
	16-41	Gravelly loamy sand, very gravelly very fine sandy loam, very cobbly loamy sand.	SM, SM-SC, SP-SM	A-2, A-4, A-1, A-3	15-55	65-85	50-75	25-70	5-45	<25	NP-7
	41-60	Gravelly fine sandy loam, gravelly loamy fine sand, very cobbly loamy sand.	SM, SM-SC, SP-SM	A-2, A-4, A-1, A-3	15-55	65-85	50-75	25-70	5-45	<25	NP-7

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
103D*:											
Rockbottom------	0-10	Stony silt loam	CL-ML, CL	A-4, A-6	20-50	95-100	90-100	85-100	65-90	20-35	4-15
	10-17	Silty clay loam, clay loam.	CL	A-6, A-7	0-15	95-100	90-100	90-100	70-95	35-45	15-25
	17-29	Extremely cobbly sandy clay loam, very gravelly sandy clay loam.	SC	A-6, A-7, A-2-6, A-2-7	25-65	70-85	45-70	30-50	25-50	35-45	15-25
	29-60	Very gravelly fine sandy loam, extremely cobbly sandy loam.	SM, SP-SM	A-2-4, A-1-a, A-1-b	35-65	70-85	45-70	25-45	10-35	>20	NP-4
103E*:											
Velvet----------	0-3	Very stony loamy sand.	SM, SP-SM, SM-SC	A-2, A-3, A-1	25-55	80-85	70-80	35-70	5-35	<21	NP-4
	3-16	Very cobbly loamy sand, cobbly loamy fine sand, very stony loamy sand.	SM, SP-SM, SM-SC	A-2, A-3, A-1	25-55	65-85	50-75	25-70	5-35	<21	NP-4
	16-41	Gravelly loamy sand, very cobbly loamy sand, very gravelly very fine sandy loam.	SM, SP-SM, SM-SC	A-2, A-4, A-1, A-3	15-55	65-85	50-75	25-70	5-45	<25	NP-7
	41-60	Gravelly fine sandy loam, gravelly loamy fine sand, very cherty loamy sand.	SM, SP-SM, SM-SC	A-2, A-4, A-1, A-3	15-55	65-85	50-75	25-70	5-45	<25	NP-7
Rockbottom------	0-10	Stony silt loam	CL-ML, CL	A-4, A-6	20-50	95-100	90-100	85-100	65-90	20-35	4-15
	10-17	Silty clay loam, clay loam.	CL	A-6, A-7	0-15	95-100	90-100	90-100	70-95	35-45	15-25
	17-29	Extremely cobbly sandy clay loam, very gravelly sandy clay loam.	SC	A-6, A-7, A-2-6, A-2-7	25-65	70-85	45-70	30-50	25-50	35-45	15-25
	29-60	Very gravelly fine sandy loam, extremely cobbly sandy loam.	SM, SP-SM	A-2-4, A-1-a, A-1-b	25-65	70-85	45-70	25-45	10-35	<20	NP-4
104B, 104D, 104F-Amasa	0-5	Very fine sandy loam.	ML, CL-ML, SM, SM-SC	A-4	0-20	95-100	90-100	65-100	35-55	<25	NP-7
	5-22	Fine sandy loam, very fine sandy loam.	ML, CL-ML, SM, SM-SC	A-4	0-8	95-100	90-100	65-100	35-90	<25	NP-7
	22-60	Sand-------------	SP-SM, SM	A-1, A-3, A-2-4	0-8	95-100	95-100	40-60	5-15	---	NP

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
106A*:											
Potagannissing--	0-4	Gravelly silt loam.	ML, SM	A-4	0-20	85-100	60-90	45-90	35-85	<30	NP-6
	4-7	Gravelly fine sandy loam, cobbly fine sandy loam, very fine sandy loam.	ML, SM, SP-SM	A-2-4, A-4, A-1-b	0-20	85-100	60-95	30-95	10-80	<30	NP-6
	7-11	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
107B------------- Oldman	0-5	Stony fine sandy loam.	SM, SM-SC, ML, CL-ML	A-4, A-2-4, A-1	20-45	80-95	70-90	40-85	20-55	<25	NP-5
	5-19	Very gravelly fine sandy loam, very cobbly fine sandy loam.	SM, GP-GM, GM-GC, ML	A-4, A-2-4, A-1	30-55	60-85	45-75	30-75	10-60	<25	NP-5
	19-46	Very gravelly fine sandy loam, very cobbly sandy loam.	GM-GC, GP-GM, SM, GM	A-4, A-2-4, A-1	30-55	60-85	45-75	30-70	10-45	<25	NP-5
	46-60	Very gravelly fine sandy loam, very cobbly sandy loam.	GM-GC, GP-GM, SM, GM	A-4, A-2-4, A-1	30-55	60-85	45-75	30-70	10-45	<25	NP-5
108D*:											
Shelter---------	0-6	Very stony loam	CL, CL-ML, SC, SM-SC	A-4	25-55	85-100	65-90	55-90	35-85	<30	5-10
	6-12	Very cobbly fine sandy loam, very cobbly loam, very cobbly silt loam.	CL, CL-ML, SC, SM-SC	A-4, A-2-4, A-1-b	30-55	75-80	50-70	30-70	10-70	<30	5-10
	12-60	Very cobbly fine sandy loam, very cobbly loam, very cobbly silt loam.	CL, CL-ML, SC, SM-SC	A-4, A-2-4, A-1-b	30-55	75-80	50-70	30-70	10-70	<30	5-10
Alpena----------	0-16	Very cobbly sandy loam.	SM, SP-SM, GM, GP-GM	A-2-4, A-1	35-65	50-85	35-50	5-45	5-35	<25	NP-7
	16-60	Stratified extremely gravelly sand to sand.	SP, SP-SM, GP, GP-GM	A-1	0-10	35-75	25-45	10-35	0-10	---	NP
111-------------- Gutport	0-13	Sapric material	PT	A-8	0	---	---	---	---	---	---
	13-17	Silt loam, silty clay loam, clay.	CH, CL	A-7	0	100	100	90-100	75-95	45-70	25-40
	17-27	Silty clay, clay	CH, CL	A-7	0	100	100	90-100	75-95	40-70	20-45
	27-31	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
112--------------- Soo	0-7	Silty clay loam	CL	A-7, A-6	0	100	95-100	85-100	75-95	35-50	15-25
	7-17	Silty clay loam	CL	A-7, A-6	0	100	95-100	85-100	80-95	35-50	15-25
	17-60	Stratified silty clay loam to silt loam.	CL	A-7, A-6	0	100	95-100	80-100	65-95	25-50	10-25
113--------------- Ruse	0-5	Mucky fine sandy loam.	SM, SM-SC	A-2, A-4, A-1-b	0-15	90-100	75-100	45-85	20-50	<25	NP-7
	5-14	Fine sandy loam, gravelly loam, loam.	SC, CL, CL-ML, SM-SC	A-2-4, A-4, A-6, A-2-6	0-15	90-100	55-100	50-95	20-75	20-35	5-15
	14-18	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
114B, 114D-------- Velvet	0-3	Very stony loamy sand.	SM, SP-SM	A-2, A-3, A-1	25-55	80-85	70-80	35-70	5-35	<21	NP-4
	3-16	Very cobbly loamy sand, cobbly loamy fine sand, very stony loamy sand.	SM, SP-SM	A-2, A-3, A-1	15-55	65-85	50-75	25-70	5-35	<21	NP-4
	16-41	Gravelly loamy sand, very gravelly very fine sandy loam, very cobbly loamy sand.	SM, SM-SC, SP-SM	A-2, A-4, A-1, A-3	15-55	65-85	50-75	25-70	5-45	<25	NP-7
	41-60	Gravelly fine sandy loam, gravelly loamy fine sand, very cobbly loamy sand.	SM, SM-SC, SP-SM	A-2, A-4, A-1, A-3	15-55	65-85	50-75	25-70	5-45	<25	NP-7
116*. Udorthents											
117B, 117D, 117F- Manistee	0-9	Sand--------------	SP-SM, SM	A-3, A-2-4, A-1-b	0-2	95-100	90-100	45-80	5-35	---	NP
	9-21	Sand, loamy sand, fine sand.	SP-SM, SM	A-2-4, A-1-b, A-3	0-2	95-100	90-100	45-80	5-35	---	NP
	21-35	Clay, silty clay	CH, CL	A-7	0	100	100	90-100	80-95	45-65	25-40
	35-60	Clay, silty clay, silty clay loam.	CH, CL	A-7	0	100	100	90-100	85-95	45-65	20-40
119--------------- Gogomain	0-6	Very fine sandy loam.	ML, CL-ML, CL	A-4	0	100	100	85-100	50-90	<25	NP-9
	6-37	Very fine sand, loamy very fine sand, very fine sandy loam.	SM, SM-SC, ML, CL-ML	A-2-4, A-4	0	100	100	60-100	25-90	<25	NP-9
	37-60	Clay, silty clay	CH, CL	A-7	0	100	100	90-100	75-95	45-70	25-40

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
121B------------- Rockbottom	0-10	Stony silt loam	CL-ML, CL	A-4, A-6	20-50	95-100	90-100	85-100	65-90	20-35	4-15
	10-17	Silty clay loam, clay loam.	CL	A-6, A-7	0-15	95-100	90-100	90-100	70-95	35-45	15-25
	17-29	Extremely cobbly sandy clay loam, very gravelly sandy clay loam.	SC	A-6, A-7, A-2-6, A-2-7	25-65	70-85	45-70	30-50	25-50	35-45	15-25
	29-60	Very gravelly fine sandy loam, extremely cobbly sandy loam.	SM, SP-SM	A-2-4, A-1-a, A-1-b	35-65	70-85	45-70	25-45	10-35	>20	NP-4
122*. Pits											
123B------------- Ocqueoc	0-8	Fine sand--------	SM, SP-SM	A-3, A-2	0	100	100	50-80	5-15	<20	NP-4
	8-22	Sand, loamy fine sand, fine sand.	SM, SP-SM, SM-SC	A-3, A-2	0	100	100	50-80	5-30	<25	NP-4
	22-60	Stratified fine sand to silt loam.	SM-SC, CL-ML, CL, SC	A-6, A-4, A-2	0	100	100	65-95	20-85	20-40	4-20
124D------------- Alpena	0-16	Very cobbly sandy loam.	SM, SP-SM, GM, GP-GM	A-2-4, A-1	35-55	50-85	35-50	5-45	5-35	<25	NP-7
	16-60	Stratified very gravelly sand to sand.	SP, SP-SM, GP, GP-GM	A-1	0-10	35-75	25-45	10-35	0-10	---	NP
125B*: Croswell---------	0-2	Sand-------------	SP-SM, SM	A-3, A-2-4, A-1-b	0	90-100	85-100	40-70	5-15	---	NP
	2-60	Sand-------------	SP-SM, SM, SP	A-3, A-2-4, A-1-b	0	90-100	85-100	40-70	3-15	---	NP
Markey----------	0-33	Sapric material	PT	A-8	---	---	---	---	---	---	---
	33-60	Sand, loamy sand	SP, SM, SP-SM	A-2, A-3, A-1	0	95-100	75-100	35-75	0-30	---	NP
126-------------- Pickford	0-7	Silt loam--------	CL	A-4, A-6	0	100	100	85-100	60-90	25-40	7-15
	7-16	Clay, silty clay, silty clay loam.	CH, CL	A-7	0	100	100	90-100	75-95	40-70	20-40
	16-60	Clay, silty clay	CH, CL	A-7	0	100	100	90-100	75-95	45-70	25-40
127-------------- Gay	0-5	Stony muck-------	PT	A-8	20-50	---	---	---	---	---	---
	5-10	Sandy loam, loamy sand, stony sandy loam.	SM, SM-SC, SW-SM, SP-SM	A-2-4, A-4, A-1-b	0-35	95-100	85-100	40-75	10-40	<25	NP-7
	10-24	Sandy loam-------	SM, SM-SC, SC	A-2-4, A-4	0-2	95-100	85-100	50-85	25-50	<30	2-10
	24-60	Sandy loam-------	SM-SC, SC	A-2-4, A-4, A-2-6, A-6	0-6	95-100	85-100	50-85	25-50	20-35	4-15

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
128F*:											
Alcona----------	0-3	Loamy very fine sand.	SM	A-2-4	0-8	95-100	90-100	70-95	15-35	<25	NP-4
	3-17	Loamy fine sand, very fine sandy loam, loamy very fine sand.	SM, ML, SC, CL	A-4, A-2-4	0-8	95-100	90-100	55-95	15-65	<30	NP-10
	17-55	Loamy sand, loamy very fine sand, very fine sandy loam.	SM, ML, SC, CL	A-4, A-2-4	0-8	95-100	40-100	35-75	15-65	<30	NP-10
	55-60	Stratified fine sand to silt loam.	SM, ML, SM-SC, CL-ML	A-2-4, A-4	0-8	95-100	90-100	60-95	25-85	<30	NP-10
Markey----------	0-33	Sapric material	PT	A-8	---	---	---	---	---	---	---
	33-60	Sand, loamy sand	SP, SM, SP-SM	A-2, A-3, A-1	0	95-100	75-100	35-75	0-30	---	NP
129A------------ Rudyard	0-9	Silt loam--------	CL, CL-ML	A-4, A-6	0	100	100	85-100	60-90	25-40	5-15
	9-21	Clay-------------	CH	A-7	0	100	100	90-100	75-95	65-90	40-55
	21-60	Clay-------------	CH	A-7	0	100	100	90-100	75-95	65-90	40-55
130A*:											
Rudyard---------	0-6	Silty clay loam	CL	A-7, A-6	0	100	100	95-100	85-95	35-45	11-20
	6-17	Clay-------------	CH	A-7	0	100	100	90-100	75-95	65-90	40-55
	17-60	Clay-------------	CH	A-7	0	100	100	90-100	75-95	65-90	40-55
Pickford--------	0-8	Silty clay loam	CL	A-7, A-6	0	100	100	90-100	70-95	30-50	10-25
	8-24	Clay, silty clay, silty clay loam.	CH, CL	A-7	0	100	100	90-100	75-95	40-70	20-40
	24-60	Clay, silty clay	CH, CL	A-7	0	100	100	90-100	75-95	45-70	25-40
132B, 132F------- Sugar	0-3	Very fine sandy loam.	CL-ML, CL	A-4	0	100	100	85-100	50-90	20-30	5-10
	3-34	Very fine sand, very fine sandy loam, silt loam.	CL-ML, ML, CL	A-4	0	100	100	85-100	80-90	<30	NP-10
	34-45	Silty clay, clay, silty clay loam.	CH, CL	A-7	0	100	100	90-100	75-95	45-70	25-40
	45-60	Silty clay, clay	CH, CL	A-7	0	100	100	90-100	75-95	45-70	25-40
133-------------- Dora	0-12	Sapric material	PT	A-8	0	---	---	---	---	---	---
	12-25	Sapric material, hemic material.	PT	A-8	0	---	---	---	---	---	---
	25-60	Silty clay loam, silty clay, clay.	CH, CL	A-7	0	100	100	90-100	90-100	45-70	25-40
135B*:											
Longrie---------	0-9	Sandy loam-------	SM, SM-SC	A-2-4, A-4	0-25	95-100	85-100	50-85	25-50	<25	NP-7
	9-27	Loam, fine sandy loam, gravelly silt loam.	SM-SC, CL-ML, CL, SC	A-2-4, A-4, A-1-b	0-25	95-100	75-95	45-95	20-75	20-30	4-10
	27-31	Loam, fine sandy loam, gravelly loam.	SM-SC, SC, CL, CL-ML	A-4, A-2-4, A-1-b	0-25	95-100	75-90	45-90	20-70	20-30	4-10
	31-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
135B*:											
Posen	0-3	Stony fine sandy loam.	SM, SC, SM-SC	A-4, A-2, A-1-b	20-45	85-100	75-90	35-90	15-50	<30	NP-10
	3-16	Very gravelly fine sandy loam, very cobbly sandy loam, stony silt loam.	ML, CL, SM, SC	A-2, A-4, A-1-b	20-60	80-100	45-85	35-80	15-65	<30	NP-10
	16-60	Very cobbly sandy loam, very gravelly fine sandy loam, very cobbly loam.	ML, CL, SM, SC	A-2, A-4, A-1-b	20-60	90-100	45-85	35-70	15-55	<30	NP-10
136A*:											
Westbury	0-1	Stony fine sandy loam.	SM, ML, GM	A-2, A-4, A-1	5-25	55-80	50-75	30-75	15-70	<15	NP-4
	1-13	Gravelly loam, silt loam, gravelly fine sandy loam.	SM, GM, ML	A-2, A-4, A-1	0-40	55-95	50-90	30-90	15-80	<15	NP-4
	13-45	Gravelly sandy loam, very gravelly sandy loam, gravelly loam.	SM, GM, GW-GM, ML	A-1, A-2, A-4	0-40	40-90	35-85	20-80	10-65	<15	NP-4
	45-60	Gravelly sandy loam, very gravelly sandy loam, gravelly loam.	GM, GW-GM, SM, ML	A-1, A-2, A-4	0-40	40-90	35-85	20-80	10-65	<15	NP-4
Gay	0-5	Stony muck	PT	A-8	20-50	---	---	---	---	---	---
	5-10	Sandy loam, loamy sand, stony sandy loam.	SM, SM-SC, SW-SM, SP-SM	A-2-4, A-4, A-1-b	0-35	95-100	85-100	40-75	10-40	<25	NP-7
	10-24	Sandy loam	SM, SM-SC, SC	A-2-4, A-4	0-2	95-100	85-100	50-85	25-50	<30	2-10
	24-60	Sandy loam	SM-SC, SC	A-2-4, A-4, A-2-6, A-6	0-6	95-100	85-100	50-85	25-50	20-35	4-15
137A*:											
Kinross	0-5	Sapric material	PT	A-8	0	---	---	---	---	---	NP
	5-42	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	50-80	5-30	---	NP
	42-60	Sand, fine sand	SP-SM, SM	A-3, A-2-4	0	100	100	50-80	5-30	---	NP
Wainola	0-10	Fine sand	SM	A-2-4	0	100	90-100	60-80	15-35	---	NP
	10-39	Fine sand, loamy fine sand.	SM, ML	A-2-4, A-4	0	100	90-100	50-80	15-55	---	NP
	39-60	Fine sand, loamy fine sand.	SM, ML	A-2-4, A-4	0	100	90-100	50-80	15-55	---	NP

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
138B*:											
Rousseau--------	0-2	Fine sand--------	SM	A-2-4	0	100	100	65-80	20-35	---	NP
	2-17	Fine sand--------	SM	A-2-4	0	100	100	65-80	20-25	---	NP
	17-60	Fine sand--------	SM	A-2-4	0	100	100	65-80	20-25	---	NP
Urban land.											
139A*:											
Rudyard---------	0-6	Silty clay loam	CL	A-7, A-6	0	100	100	95-100	85-95	35-45	11-20
	6-17	Clay-------------	CH	A-7	0	100	100	90-100	75-95	65-90	40-55
	17-60	Clay-------------	CH	A-7	0	100	100	90-100	75-95	65-90	40-55
Urban land.											
143-------------- Burleigh	0-7	Loamy fine sand	SM, SP-SM	A-2-4	0	100	100	50-75	10-25	---	NP
	7-21	Fine sand, loamy fine sand.	SP-SM, SM	A-3, A-2-4	0	100	100	50-70	5-35	---	NP
	21-60	Stratified fine sand to silt loam.	ML, SM	A-4	0	100	100	75-100	35-90	20-40	NP-10
144*:											
Urban land.											
Udorthents.											
145A*:											
Gaastra---------	0-8	Silt loam--------	CL-ML, CL	A-4	0	100	100	85-100	50-90	20-30	5-10
	8-41	Silt loam, very fine sandy loam, loamy very fine sand.	ML, CL-ML, SM, SM-SC	A-4	0	100	100	60-100	35-60	<30	NP-10
	41-60	Stratified silt loam to fine sandy loam.	CL-ML, CL, SC, SM-SC	A-4	0	100	100	85-100	40-90	20-30	5-10
Gogomain---------	0-6	Very fine sandy loam.	ML, CL-ML, CL	A-4	0	100	100	85-100	50-90	<25	NP-9
	6-37	Very fine sand, loamy very fine sand, very fine sandy loam.	SM, SM-SC, ML, CL-ML	A-2-4, A-4	0	100	100	60-100	25-90	<25	NP-9
	37-60	Clay, silty clay	CH, CL	A-7	0	100	100	90-100	75-95	45-70	25-40
Ingalls---------	0-7	Loamy sand-------	SM, SP-SM	A-2, A-1	0-8	90-100	85-100	40-80	10-35	---	NP
	7-40	Loamy sand, sand, loamy fine sand.	SM, SP-SM	A-2, A-3, A-1	0-8	90-100	85-100	40-80	5-35	---	NP
	40-60	Stratified silt to loamy fine sand.	CL, CL-ML, SC, SM-SC	A-6, A-4	0	95-100	90-100	65-100	45-95	20-35	4-15
146A*:											
Allendale-------	0-5	Loamy fine sand	SM, SP-SM	A-2-4, A-1-b, A-4	0	95-100	90-100	45-80	10-40	---	NP
	5-31	Fine sand, sand, loamy fine sand.	SM, SP-SM	A-2-4, A-3, A-4, A-1-b	0	95-100	90-100	45-80	5-40	---	NP
	31-60	Silty clay, clay	CH, MH	A-7	0	100	90-100	90-100	75-95	50-70	20-40

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
146A*:											
Fibre-----------	0-5	Sapric material	PT	A-8	0	---	---	---	---	---	---
	5-17	Loamy sand, sand, fine sand.	SM, SP-SM	A-3, A-2-4	0	100	90-100	50-80	5-35	<20	NP-4
	17-19	Loamy sand, fine sandy loam, sandy loam.	SM, SM-SC, SC, ML	A-2-4, A-2, A-6, A-4	0	100	90-100	50-85	15-55	<30	NP-11
	19-27	Clay, silty clay	CH, CL	A-7	0	100	100	95-100	75-95	40-70	20-45
	27-60	Stratified clay to silt loam.	CH, CL	A-7	0	100	100	95-100	75-95	40-70	25-45
147B, 147D------- Shelter	0-6	Very stony loam	CL, CL-ML, SC, SM-SC	A-4	25-55	85-100	65-90	55-90	35-85	<30	5-10
	6-12	Very cobbly fine sandy loam, very cobbly loam, very cobbly silt loam.	CL, CL-ML, SC, SM-SC	A-4, A-2-4, A-1-b	30-55	75-80	50-70	30-70	10-70	<30	5-10
	12-60	Very cobbly fine sandy loam, very cobbly loam, very cobbly silt loam.	CL, CL-ML, SC, SM-SC	A-4, A-2-4, A-1-b	30-55	75-80	50-70	30-70	10-70	<30	5-10
148B*:											
Longrie---------	0-9	Silt loam--------	CL, CL-ML	A-4	0-25	95-100	85-100	70-100	50-90	20-30	4-10
	9-27	Loam, fine sandy loam, gravelly silt loam.	SM-SC, CL-ML, CL, SC	A-2-4, A-4, A-1-b	0-25	95-100	75-95	45-95	20-75	20-30	4-10
	27-31	Loam, fine sandy loam, gravelly loam.	SM-SC, SC, CL, CL-ML	A-4, A-2-4, A-1-b	0-25	95-100	75-90	45-90	20-70	20-30	4-10
	31-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
149B------------- Kalkaska	0-7	Sand-------------	SP-SM, SM	A-1, A-2, A-3	0	95-100	90-100	45-70	5-15	---	NP
	7-9	Sand, loamy sand	SM, SP-SM	A-1, A-2, A-3	0	95-100	90-100	45-75	5-30	---	NP
	9-25	Sand-------------	SP-SM, SM	A-1, A-2, A-3	0	95-100	90-100	45-70	5-15	---	NP
	25-60	Sand-------------	SP-SM, SM	A-1, A-2, A-3	0	95-100	90-100	45-70	5-15	---	NP
150-------------- Fibre	0-5	Sapric material	PT	A-8	0	---	---	---	---	---	---
	5-17	Loamy sand, sand, fine sand.	SM, SP-SM	A-3, A-2-4	0	100	90-100	50-80	5-35	<20	NP-4
	17-19	Loamy sand, fine sandy loam, sandy loam.	SM, SM-SC, SC, ML	A-2-4, A-2, A-6, A-4	0	100	90-100	50-85	15-55	<30	NP-11
	19-27	Clay, silty clay	CH, CL	A-7	0	100	100	95-100	75-95	40-70	20-45
	27-60	Stratified clay to silt loam.	CH, CL	A-7	0	100	100	95-100	75-95	40-70	25-45

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
151--------------- Beavertail	0-8	Sapric material	PT	A-8	0-15	---	---	---	---	---	---
	8-16	Very gravelly loam, very gravelly fine sandy loam, very gravelly sandy loam.	GC, SM-SC, SC, SP-SC	A-4, A-2-4, A-1	8-25	65-90	40-55	25-50	10-50	20-30	4-10
	16-29	Very gravelly loam, very gravelly fine sandy loam, very gravelly sandy loam.	GC, SM-SC, SC, SP-SC	A-4, A-2-4, A-1	8-25	65-90	40-55	25-50	10-50	20-30	4-10
	29-60	Very gravelly loam, very gravelly fine sandy loam, very gravelly sandy loam.	GC, SM-SC, SC, SP-SC	A-4, A-2-4, A-1	8-25	65-90	40-55	25-50	10-50	20-30	4-10
152--------------- Grousehaven	0-15	Sapric material	PT	A-8	0	---	---	---	---	---	NP
	15-60	Marl---------------	OH, MH	A-8, A-5, A-7	0	100	95-100	80-90	60-80	50-90	NP-20
153*. Dumps											
154F*:											
Dawson-----------	0-6	Fibric material	PT	A-8	0	---	---	---	---	---	---
	6-18	Sapric material	PT	A-8	0	---	---	---	---	---	---
	18-60	Sand, fine sand, loamy fine sand.	SM, SP-SM	A-2, A-3	0	100	100	50-80	5-30	---	NP
Deer Park--------	0-8	Fine sand---------	SM	A-2	0	100	100	65-80	20-35	---	NP
	8-51	Fine sand, sand	SM, SP-SM	A-2, A-3	0	100	100	50-80	5-30	---	NP
	51-60	Fine sand, sand	SP-SM, SM	A-2, A-3	0	100	100	50-80	5-30	---	NP
Wainola----------	0-5	Fine sand---------	SM	A-2-4	0	100	90-100	60-80	15-35	---	NP
	5-24	Fine sand, loamy fine sand.	SM, ML	A-2-4, A-4	0	100	90-100	50-80	15-55	---	NP
	24-60	Fine sand, loamy fine sand.	SM, ML	A-2-4, A-4	0	100	90-100	50-80	15-55	---	NP
155B*:											
Allendale--------	0-5	Loamy fine sand	SM, SP-SM	A-2-4, A-1-b, A-4	0	95-100	90-100	45-80	10-40	---	NP
	5-31	Fine sand, sand, loamy fine sand.	SM, SP-SM	A-2-4, A-3, A-4, A-1-b	0	95-100	90-100	45-80	5-40	---	NP
	31-60	Silty clay, clay	CH, MH	A-7	0	100	90-100	90-100	75-95	50-70	20-40

See footnote at end of table.

TABLE 17.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
155B*:											
Posen	0-3	Stony fine sandy loam.	SM, SC, SM-SC	A-4, A-2, A-1-b	20-45	85-100	75-90	35-90	15-50	<30	NP-10
	3-16	Very gravelly loam, very cobbly silt loam, stony silt loam.	ML, CL, SM, SC	A-2, A-4, A-1-b	20-60	80-100	45-85	35-80	15-65	<30	NP-10
	16-60	Very cobbly sandy loam, very gravelly fine sandy loam, very cobbly loam.	ML, CL, SM, SC	A-2, A-4, A-1-b	20-60	90-100	45-85	35-70	15-55	<30	NP-10
Pickford	0-8	Silty clay loam	CL	A-7, A-6	0	100	100	90-100	70-95	30-50	10-25
	8-24	Clay, silty clay, silty clay loam.	CH, CL	A-7	0	100	100	90-100	75-95	40-70	20-40
	24-60	Clay, silty clay	CH, CL	A-7	0	100	100	90-100	75-95	45-70	25-40
156A*:											
Rockcut	0-4	Extremely cobbly loamy sand.	SP-SM, SM, SC, GM-GC	A-1, A-2-4, A-3	30-65	60-90	55-85	15-60	5-35	<25	NP-10
	4-14	Extremely cobbly loamy sand, extremely cobbly sand, very gravelly coarse sand.	SP-SM, SM, GM, GP-GM	A-1, A-2-4, A-3	30-65	60-90	55-85	15-60	5-25	<20	NP-4
	14-17	Stratified gravelly loamy sand to silty clay loam.	SM, SC, CL, ML	A-4, A-6, A-2, A-7	0-15	80-100	75-90	35-90	5-75	20-45	NP-25
	17-60	Stratified silt to silty clay.	CL, CH, CL-ML	A-4, A-6, A-7	0	100	100	80-100	80-100	20-60	5-35
Pinconning	0-8	Loamy sand	SM, SP-SM	A-2-4, A-3	0	100	95-100	50-75	5-35	---	NP
	8-30	Sand, loamy sand, fine sand.	SP-SM, SM	A-3, A-2-4	0	100	95-100	50-80	5-35	---	NP
	30-60	Clay, silty clay, silty clay loam.	CH, CL	A-7	0	100	95-100	90-100	75-95	40-60	25-35
159B*, 159F*											
Amasa	0-5	Very fine sandy loam.	ML, CL-ML, SM, SM-SC	A-4	0-20	95-100	90-100	65-100	35-55	<25	NP-7
	5-22	Fine sandy loam, very fine sandy loam.	ML, CL-ML, SM, SM-SC	A-4	0-8	95-100	90-100	65-100	35-90	<25	NP-7
	22-60	Sand	SP-SM, SM	A-1, A-3, A-2-4	0-8	95-100	95-100	40-60	5-15	---	NP
Sugar	0-3	Very fine sandy loam.	CL-ML, CL	A-4	0	100	100	85-100	50-90	20-30	5-10
	3-34	Very fine sand, very fine sandy loam, silt loam.	CL-ML, ML, CL	A-4	0	100	100	85-100	80-90	<30	NP-10
	34-45	Silty clay, clay, silty clay loam.	CH, CL	A-7	0	100	100	90-100	75-95	45-70	25-40
	45-60	Silty clay, clay	CH, CL	A-7	0	100	100	90-100	75-95	45-70	25-40

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

(The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Wind erodibility group" and "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated)

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
10B, 10D, 10F	0-7	20-27	1.00-1.30	0.6-2.0	0.21-0.23	4.5-6.5	Low	0.43	3	6	1-3
Ontonagon	7-21	60-85	1.35-1.45	<0.06	0.11-0.13	4.5-7.8	High	0.28			
	21-60	60-85	1.35-1.45	<0.06	0.11-0.13	7.4-8.4	High	0.28			
11A	0-6	27-40	1.00-1.60	0.2-0.6	0.21-0.23	5.1-7.3	Moderate	0.37	3	4	3-4
Rudyard	6-17	60-85	1.10-1.40	<0.06	0.11-0.13	5.1-7.3	High	0.28			
	17-60	60-80	1.35-1.45	<0.06	0.11-0.13	7.4-8.4	High	0.28			
12	0-8	27-40	1.10-1.35	0.2-0.6	0.20-0.24	5.1-7.8	Moderate	0.43	3	7	10-15
Pickford	8-24	35-60	1.40-1.65	<0.06	0.09-0.13	5.1-7.8	Moderate	0.32			
	24-60	40-60	1.50-1.70	<0.06	0.08-0.12	7.4-8.4	Moderate	0.32			
13B, 13D	0-3	2-15	1.10-1.60	0.6-6.0	0.10-0.14	4.5-7.3	Low	0.17	5	2	1-3
Alcona	3-17	5-20	1.25-1.70	0.6-6.0	0.10-0.17	4.5-7.3	Low	0.17			
	17-55	5-18	1.35-1.70	0.6-6.0	0.08-0.17	5.1-7.8	Low	0.17			
	55-60	5-18	1.50-1.70	0.6-2.0	0.08-0.20	5.1-7.8	Low	0.24			
13F	0-3	2-15	1.30-1.60	0.6-6.0	0.10-0.14	4.5-7.3	Low	0.17	5	2	1-3
Alcona	3-17	5-20	1.35-1.70	0.6-6.0	0.10-0.17	4.5-7.3	Low	0.17			
	17-55	5-18	1.35-1.70	0.6-6.0	0.08-0.17	5.1-7.8	Low	0.17			
	55-60	5-18	1.35-1.70	0.6-2.0	0.08-0.20	5.1-7.8	Low	0.24			
14A	0-8	10-18	1.40-1.60	0.6-2.0	0.20-0.24	4.5-6.5	Low	0.37	5	5	3-4
Gaastra	8-41	6-18	1.40-1.60	0.6-2.0	0.14-0.22	5.1-6.5	Low	0.37			
	41-60	10-18	1.50-1.70	0.2-0.6	0.20-0.22	5.1-7.3	Low	0.37			
15B, 15D, 15E,											
15F	0-2	0-10	1.35-1.65	6.0-20	0.07-0.09	4.5-6.0	Low	0.15	5	1	1-2
Rousseau	2-17	0-10	1.30-1.70	6.0-20	0.06-0.08	4.5-6.0	Low	0.15			
	17-60	0-10	1.55-1.65	6.0-20	0.06-0.08	5.1-6.5	Low	0.15			
17D, 17F	0-8	0-10	1.30-1.55	6.0-20	0.04-0.07	5.1-6.0	Low	0.15	5	1	.5-1
Deer Park	8-51	0-10	1.40-1.60	6.0-20	0.03-0.06	5.1-6.5	Low	0.15			
	51-60	0-10	1.40-1.55	6.0-20	0.03-0.05	5.1-6.5	Low	0.15			
18B, 18D, 18E	0-3	0-5	1.35-1.55	6.0-20	0.05-0.09	4.5-6.0	Low	0.15	5	1	.5-1
Rubicon	3-20	0-10	1.30-1.60	6.0-20	0.04-0.08	4.5-6.0	Low	0.15			
	20-60	0-5	1.40-1.65	6.0-20	0.04-0.06	4.5-6.5	Low	0.15			
19B, 19D, 19E,											
19F	0-7	0-10	1.25-1.45	6.0-20	0.05-0.09	3.6-6.0	Low	0.15	5	1	1-4
Kalkaska	7-9	0-15	1.35-1.45	6.0-20	0.06-0.08	3.6-6.0	Low	0.15			
	9-25	0-10	1.35-1.45	6.0-20	0.06-0.08	4.5-6.0	Low	0.15			
	25-60	0-10	1.35-1.50	6.0-20	0.04-0.06	4.5-6.5	Low	0.15			
20A	0-2	0-10	1.30-1.55	6.0-20	0.06-0.09	3.6-6.5	Low	0.15	5	1	.5-2
Croswell	2-60	0-10	1.50-1.65	6.0-20	0.05-0.07	5.1-8.4	Low	0.15			
21A	0-5	0-8	1.30-1.55	6.0-20	0.07-0.10	3.6-7.3	Low	0.15	5	1	.5-8
Au Gres	5-60	0-8	1.50-1.70	6.0-20	0.05-0.07	5.1-7.3	Low	0.15			
22	0-10	---	0.10-0.35	2.0-6.0	0.35-0.45	3.6-5.0	-------------	----	5	2	>50
Kinross	10-42	0-10	1.40-1.70	6.0-20	0.04-0.09	3.6-6.0	Low	0.15			
	42-60	0-10	1.40-1.70	6.0-20	0.04-0.06	4.5-6.5	Low	0.15			
23	0-9	---	0.30-0.40	0.2-6.0	0.35-0.45	5.6-7.8	-------------	----	5	2	40-60
Roscommon	9-60	0-10	1.45-1.70	6.0-20	0.05-0.09	5.6-8.4	Low	0.17			

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
25B, 25D---------	0-5	8-20	1.30-1.60	0.6-2.0	0.20-0.22	5.1-7.3	Low----------	0.32	3	5	1-3
Guardlake	5-16	2-12	1.35-1.70	0.6-2.0	0.09-0.17	5.1-7.3	Low----------	0.24			
	16-60	0-10	1.55-1.65	>20	0.02-0.06	7.9-8.4	Low----------	0.10			
27B--------------	0-6	3-12	1.30-1.65	2.0-6.0	0.12-0.15	5.6-7.3	Low----------	0.24	5	3	1-3
Emmet	6-14	3-12	1.40-1.70	2.0-6.0	0.11-0.14	5.6-7.3	Low----------	0.24			
	14-29	10-18	1.50-1.75	0.6-2.0	0.11-0.18	6.6-7.8	Moderate-----	0.32			
	29-60	5-15	1.50-1.75	0.6-6.0	0.08-0.14	7.4-8.4	Low----------	0.28			
28B--------------	0-9	5-15	1.10-1.60	2.0-6.0	0.10-0.16	5.1-7.3	Low----------	0.24	4	3	1-3
Longrie	9-27	10-18	1.35-1.65	0.6-2.0	0.09-0.19	5.1-7.3	Low----------	0.32			
	27-31	10-18	1.35-1.65	0.6-2.0	0.09-0.18	6.6-7.8	Low----------	0.32			
	31-35	---	---	---	---	---	-------------	----			
29A--------------	0-3	5-20	1.35-1.70	0.6-2.0	0.10-0.18	5.6-7.8	Low----------	0.24	5	3	1-3
Solona	3-20	12-18	1.45-1.65	0.6-2.0	0.09-0.19	6.1-7.8	Low----------	0.24			
	20-60	5-20	1.45-1.70	0.6-2.0	0.08-0.19	7.4-8.4	Low----------	0.37			
32A--------------	0-5	0-12	1.25-1.40	6.0-20	0.09-0.12	4.5-7.3	Low----------	0.17	4	2	1-3
Allendale	5-31	0-15	1.35-1.45	6.0-20	0.06-0.10	4.5-7.3	Low----------	0.17			
	31-60	40-60	1.45-1.70	<0.06	0.08-0.12	6.1-8.4	Moderate-----	0.32			
33*.											
Pits											
34.											
Entisols											
35*:											
Histosols.											
Aquents.											
36*:											
Markey----------	0-33	---	0.15-0.45	0.2-6.0	0.35-0.45	5.6-7.8	-------------	----	4	2	55-85
	33-60	0-10	1.40-1.65	6.0-20	0.03-0.08	5.6-8.4	Low----------	0.15			
Carbondale------	0-14	---	0.30-0.40	0.2-6.0	0.35-0.45	5.6-7.8	-------------	----	5	2	40-65
	14-33	---	0.13-0.23	0.2-6.0	0.35-0.45	5.6-7.8	-------------	----			
	33-60	---	0.10-0.17	0.6-6.0	0.45-0.55	5.6-7.8	-------------	----			
37*:											
Dawson----------	0-6	---	0.15-0.30	>6.0	0.55-0.65	3.6-4.4	-------------	----	4	7	65-85
	6-18	---	0.15-0.40	0.2-6.0	0.35-0.45	3.6-4.4	-------------	----			
	18-60	0-10	1.55-1.75	6.0-20	0.03-0.10	4.5-6.5	Low----------	0.15			
Loxley----------	0-10	---	0.30-0.40	>6.0	0.35-0.65	<4.5	-------------	----	5	7	70-90
	10-60	---	0.10-0.35	0.2-6.0	0.35-0.45	<4.5	-------------	----			
38F*:											
Deer Park-------	0-8	0-10	1.30-1.55	6.0-20	0.04-0.07	5.1-6.0	Low----------	0.15	5	1	.5-1
	8-51	0-10	1.40-1.60	6.0-20	0.03-0.06	5.1-6.5	Low----------	0.15			
	51-60	0-10	1.40-1.55	6.0-20	0.03-0.05	5.1-6.5	Low----------	0.15			
Kinross---------	0-10	0-10	1.10-1.20	6.0-20	0.12-0.17	3.6-5.0	Low----------	0.15	5	1	10-15
	10-42	0-10	1.40-1.70	6.0-20	0.04-0.09	3.6-6.0	Low----------	0.15			
	42-60	0-10	1.40-1.70	6.0-20	0.04-0.06	4.5-6.5	Low----------	0.15			
39D*:											
Au Gres---------	0-5	0-8	1.30-1.55	6.0-20	0.07-0.10	3.6-7.3	Low----------	0.15	5	1	.5-8
	5-60	0-8	1.50-1.70	6.0-20	0.05-0.07	5.1-7.3	Low----------	0.15			

See footnote at end of table.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
39D*:											
Dawson----------	0-6	---	0.15-0.30	>6.0	0.55-0.65	3.6-4.4	-------------	----	4	7	65-85
	6-18	---	0.15-0.40	0.2-6.0	0.35-0.45	3.6-4.4	-------------	----			
	18-60	0-10	1.55-1.75	6.0-20	0.03-0.10	4.5-6.5	Low----------	0.15			
Rubicon---------	0-3	0-5	1.35-1.55	6.0-20	0.05-0.09	4.5-6.0	Low----------	0.15	5	1	.5-1
	3-20	0-10	1.30-1.60	6.0-20	0.04-0.08	4.5-6.0	Low----------	0.15			
	20-60	0-5	1.40-1.65	6.0-20	0.04-0.06	4.5-6.5	Low----------	0.15			
40A*:											
Rudyard---------	0-6	27-40	1.00-1.60	0.2-0.6	0.21-0.23	5.1-7.3	Moderate-----	0.37	3	4	3-4
	6-17	60-85	1.10-1.40	<0.06	0.11-0.13	5.1-7.3	High---------	0.28			
	17-60	60-80	1.35-1.45	<0.06	0.11-0.13	7.4-8.4	High---------	0.28			
Allendale-------	0-5	0-12	1.25-1.40	6.0-20	0.09-0.12	4.5-7.3	Low----------	0.17	4	2	1-3
	5-31	0-15	1.35-1.45	6.0-20	0.06-0.10	4.5-7.3	Low----------	0.17			
	31-60	40-60	1.45-1.70	<0.06	0.08-0.12	6.1-8.4	Moderate-----	0.32			
41D*, 41F*:											
Summerville-----	0-3	15-22	1.30-1.60	0.6-2.0	0.18-0.22	6.1-8.4	Low----------	0.32	2	5	1-2
	3-13	10-25	1.35-1.65	0.6-2.0	0.10-0.16	5.6-8.4	Low----------	0.24			
	13-17	---	---	---	---	---	-------------	----			
Rock outcrop.											
42D*:											
Emmet-----------	0-6	3-12	1.30-1.65	2.0-6.0	0.12-0.15	5.6-7.3	Low----------	0.24	5	3	1-3
	6-14	3-12	1.40-1.70	2.0-6.0	0.11-0.14	5.6-7.3	Low----------	0.24			
	14-29	10-18	1.50-1.75	0.6-2.0	0.11-0.18	6.6-7.8	Moderate-----	0.32			
	29-60	5-15	1.50-1.75	0.6-6.0	0.08-0.14	7.4-8.4	Low----------	0.28			
Kalkaska--------	0-7	0-10	1.25-1.45	6.0-20	0.05-0.09	3.6-6.0	Low----------	0.15	5	1	1-4
	7-9	0-15	1.35-1.45	6.0-20	0.06-0.08	3.6-6.0	Low----------	0.15			
	9-25	0-10	1.35-1.45	6.0-20	0.06-0.08	4.5-6.0	Low----------	0.15			
	25-60	0-10	1.35-1.50	6.0-20	0.04-0.06	4.5-6.5	Low----------	0.15			
44B, 44D, 44E---- Posen	0-3	5-20	1.30-1.60	2.0-6.0	0.08-0.14	5.6-7.3	Low----------	0.17	5	8	1-3
	3-16	8-20	1.35-1.65	0.6-2.0	0.07-0.11	5.6-7.3	Low----------	0.20			
	16-60	8-20	1.60-1.70	0.6-2.0	0.07-0.11	7.9-8.4	Low----------	0.20			
46B, 46D, 46E---- Pence	0-4	2-6	1.35-1.65	6.0-20	0.09-0.12	4.5-6.5	Low----------	0.17	3	2	.5-2
	4-17	2-12	1.35-1.45	2.0-6.0	0.10-0.15	4.5-6.5	Low----------	0.24			
	17-28	2-10	1.65-1.75	2.0-20	0.05-0.08	4.5-6.5	Low----------	0.20			
	28-60	0-4	1.35-1.80	>6.0	0.02-0.05	5.1-6.5	Low----------	0.10			
48E*:											
Wainola---------	0-5	0-10	1.35-1.50	6.0-20	0.07-0.09	4.5-6.5	Low----------	0.15	5	1	2-4
	5-24	2-12	1.35-1.45	6.0-20	0.06-0.11	4.5-6.5	Low----------	0.15			
	24-60	0-10	1.25-1.50	6.0-20	0.05-0.07	5.1-7.3	Low----------	0.15			
Kinross---------	0-10	---	0.10-0.35	2.0-6.0	0.35-0.45	3.6-5.0	-------------	----	5	2	>50
	10-42	0-10	1.40-1.70	6.0-20	0.04-0.09	3.6-6.0	Low----------	0.15			
	42-60	0-10	1.40-1.70	6.0-20	0.04-0.06	4.5-6.5	Low----------	0.15			
Rousseau--------	0-19	0-10	1.30-1.55	6.0-20	0.07-0.09	4.5-6.0	Low----------	0.15	5	1	1-2
	19-21	0-10	1.30-1.60	6.0-20	0.06-0.08	4.5-6.5	Low----------	0.15			
	21-60	0-10	1.50-1.65	6.0-20	0.05-0.07	5.1-6.5	Low----------	0.15			
49A------------- Wainola	0-5	0-10	1.35-1.50	6.0-20	0.07-0.09	4.5-6.5	Low----------	0.15	5	1	2-4
	5-24	2-12	1.35-1.45	6.0-20	0.06-0.11	4.5-6.5	Low----------	0.15			
	24-60	0-10	1.25-1.50	6.0-20	0.05-0.07	5.1-7.3	Low----------	0.15			

See footnote at end of table.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
50	0-4	0-10	1.35-1.40	6.0-20	0.07-0.09	5.6-7.8	Low	0.15	5	2	4-10
Deford	4-60	0-12	1.40-1.60	6.0-20	0.05-0.07	5.6-8.4	Low	0.17			
52A	0-7	2-10	1.25-1.40	6.0-20	0.07-0.10	5.1-7.3	Low	0.17	5	2	.5-3
Ingalls	7-40	3-15	1.35-1.45	6.0-20	0.05-0.10	5.1-7.3	Low	0.17			
	40-60	2-25	1.45-1.80	0.2-0.6	0.09-0.22	5.6-8.4	Low	0.43			
53B	0-11	2-15	1.35-1.65	2.0-6.0	0.10-0.12	4.5-6.5	Low	0.17	5	2	2-4
Menominee	11-28	5-15	1.30-1.70	6.0-20	0.04-0.10	4.5-7.8	Low	0.17			
	28-34	18-35	1.45-1.70	0.2-0.6	0.14-0.18	5.1-7.8	Moderate	0.32			
	34-60	12-35	1.45-1.70	0.2-0.6	0.13-0.18	6.1-8.4	Moderate	0.32			
56A	0-4	15-20	1.30-1.50	0.6-2.0	0.14-0.17	6.1-7.8	Low	0.32	2	6	2-3
Ensign	4-13	10-25	1.40-1.70	0.6-2.0	0.13-0.17	6.1-8.4	Low	0.32			
	13-17	---	---	---	---	---	-------------	----			
57B*:											
Summerville	0-3	15-22	1.30-1.60	0.6-2.0	0.18-0.22	6.1-8.4	Low	0.32	2	5	1-2
	3-13	10-25	1.35-1.65	0.6-2.0	0.10-0.16	5.6-8.4	Low	0.24			
	13-17	---	---	---	---	---	-------------	----			
Longrie	0-9	5-15	1.10-1.60	2.0-6.0	0.10-0.16	5.1-7.3	Low	0.24	4	3	1-3
	9-27	10-18	1.35-1.65	0.6-2.0	0.09-0.19	5.1-7.3	Low	0.32			
	27-31	10-18	1.35-1.65	0.6-2.0	0.09-0.18	6.6-7.8	Low	0.32			
	31-35	---	---	---	---	---	-------------	----			
61A	0-7	0-10	1.25-1.45	6.0-20	0.05-0.09	4.5-6.5	Low	0.15	5	1	.5-2
Halfaday	7-37	0-10	1.35-1.50	6.0-20	0.06-0.08	4.5-6.5	Low	0.15			
	37-60	0-10	1.35-1.50	6.0-20	0.04-0.06	5.1-7.3	Low	0.15			
67B*:											
Duel	0-9	2-10	1.25-1.50	6.0-20	0.07-0.09	5.1-6.5	Low	0.15	4	1	1-2
	9-30	5-12	1.25-1.60	6.0-20	0.06-0.11	5.1-7.3	Low	0.15			
	30-38	2-35	1.50-1.65	0.6-20	0.04-0.15	7.4-8.4	Low	0.15			
	38-42	---	---	---	---	---	-------------	----			
Rock outcrop.											
68	0-8	2-12	1.00-1.20	6.0-20	0.12-0.14	5.6-7.8	Low	0.17	4	2	10-15
Pinconning	8-21	2-12	1.40-1.55	6.0-20	0.06-0.11	6.1-7.8	Low	0.17			
	21-60	35-60	1.50-1.70	<0.2	0.08-0.12	7.4-8.4	High	0.32			
78B	0-8	2-15	1.35-1.45	2.0-6.0	0.12-0.15	4.5-6.0	Low	0.24	2	3	.5-1
Waiska	8-31	2-12	1.30-1.60	6.0-20	0.04-0.08	4.5-6.0	Low	0.10			
	31-60	0-5	1.45-1.60	>20	0.01-0.03	4.5-6.0	Low	0.10			
79B*:											
Kalkaska	0-7	0-10	1.25-1.45	6.0-20	0.05-0.09	3.6-6.0	Low	0.15	5	1	1-4
	7-9	0-15	1.35-1.45	6.0-20	0.06-0.08	3.6-6.0	Low	0.15			
	9-25	0-10	1.35-1.45	6.0-20	0.06-0.08	4.5-6.0	Low	0.15			
	25-60	0-10	1.35-1.50	6.0-20	0.04-0.06	4.5-6.5	Low	0.15			
Manistee	0-9	0-10	1.35-1.60	6.0-20	0.07-0.09	4.5-7.3	Low	0.15	4	1	2-4
	9-21	2-12	1.35-1.60	6.0-20	0.06-0.10	5.1-7.3	Low	0.17			
	21-35	35-60	1.50-1.70	<0.06	0.08-0.12	5.1-7.3	High	0.32			
	35-60	35-60	1.60-1.70	0.06-0.2	0.08-0.16	6.6-8.4	High	0.32			

See footnote at end of table.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
79D*:											
Kalkaska--------	0-7	0-10	1.25-1.45	6.0-20	0.05-0.09	3.6-6.0	Low-----------	0.15	5	1	1-4
	7-9	0-15	1.35-1.45	6.0-20	0.06-0.08	3.6-6.0	Low-----------	0.15			
	9-25	0-10	1.35-1.45	6.0-20	0.06-0.08	4.5-6.0	Low-----------	0.15			
	25-60	0-10	1.35-1.50	6.0-20	0.04-0.06	4.5-6.5	Low-----------	0.15			
Manistee--------	0-9	0-10	1.35-1.60	6.0-20	0.07-0.09	4.5-7.3	Low-----------	0.15	4	1	2-4
	9-21	2-12	1.35-1.60	6.0-20	0.06-0.10	5.1-7.3	Low-----------	0.17			
	21-35	35-60	1.50-1.70	<0.06	0.08-0.12	5.1-7.3	High----------	0.32			
	35-60	35-60	1.60-1.75	0.06-0.2	0.08-0.16	6.6-8.4	High----------	0.32			
80B------------- Superior	0-2	5-13	1.35-1.65	2.0-6.0	0.12-0.18	5.6-7.3	Low-----------	0.24	3	3	1-3
	2-14	10-18	1.55-1.65	2.0-6.0	0.11-0.19	4.5-6.0	Low-----------	0.32			
	14-36	40-80	1.60-1.70	<0.06	0.08-0.13	5.1-6.5	High----------	0.32			
	36-60	40-80	1.60-1.70	<0.06	0.07-0.13	6.1-8.4	High----------	0.32			
83A*:											
Allendale-------	0-5	0-12	1.25-1.40	6.0-20	0.09-0.12	4.5-7.3	Low-----------	0.17	4	2	1-3
	5-31	0-15	1.35-1.45	6.0-20	0.06-0.10	4.5-7.3	Low-----------	0.17			
	31-60	40-60	1.45-1.70	<0.06	0.08-0.12	6.1-8.4	Moderate------	0.32			
Croswell--------	0-2	0-10	1.30-1.55	6.0-20	0.06-0.09	3.6-6.5	Low-----------	0.15	5	1	.5-2
	2-60	0-10	1.50-1.65	6.0-20	0.05-0.07	5.1-8.4	Low-----------	0.15			
84B*, 84D*:											
Rousseau--------	0-2	0-10	1.35-1.65	6.0-20	0.07-0.09	4.5-6.0	Low-----------	0.15	5	1	1-2
	2-17	0-10	1.30-1.70	6.0-20	0.06-0.08	4.5-6.0	Low-----------	0.15			
	17-60	0-10	1.55-1.65	6.0-20	0.06-0.08	5.1-6.5	Low-----------	0.15			
Alcona----------	0-3	2-15	1.10-1.60	0.6-6.0	0.10-0.14	4.5-7.3	Low-----------	0.17	5	2	1-3
	3-17	5-20	1.25-1.70	0.6-6.0	0.10-0.17	4.5-7.3	Low-----------	0.17			
	17-55	5-18	1.35-1.70	0.6-6.0	0.08-0.17	5.1-7.8	Low-----------	0.17			
	55-60	5-18	1.50-1.70	0.6-2.0	0.08-0.20	5.1-7.8	Low-----------	0.24			
84F*:											
Rousseau--------	0-2	0-10	1.35-1.65	6.0-20	0.07-0.09	4.5-6.0	Low-----------	0.15	5	1	1-2
	2-17	0-10	1.30-1.70	6.0-20	0.06-0.08	4.5-6.0	Low-----------	0.15			
	17-60	0-10	1.55-1.65	6.0-20	0.06-0.08	5.1-6.5	Low-----------	0.15			
Alcona----------	0-3	2-15	1.30-1.60	0.6-6.0	0.10-0.14	4.5-7.3	Low-----------	0.17	5	2	1-3
	3-17	5-20	1.35-1.70	0.6-6.0	0.10-0.17	4.5-7.3	Low-----------	0.17			
	17-55	5-18	1.35-1.70	0.6-6.0	0.08-0.17	5.1-7.8	Low-----------	0.17			
	55-60	5-18	1.35-1.70	0.6-2.0	0.08-0.20	5.1-7.8	Low-----------	0.24			
85B*:											
Kalkaska--------	0-7	0-10	1.25-1.45	6.0-20	0.05-0.09	3.6-6.0	Low-----------	0.15	5	1	1-4
	7-9	0-15	1.35-1.45	6.0-20	0.06-0.08	3.6-6.0	Low-----------	0.15			
	9-25	0-10	1.35-1.45	6.0-20	0.06-0.08	4.5-6.0	Low-----------	0.15			
	25-60	0-10	1.35-1.50	6.0-20	0.04-0.06	4.5-6.5	Low-----------	0.15			
Ocqueoc---------	0-8	0-10	1.30-1.60	6.0-20	0.07-0.09	4.5-6.5	Low-----------	0.15	5	1	1-3
	8-22	0-15	1.30-1.60	6.0-20	0.06-0.12	4.5-6.5	Low-----------	0.15			
	22-60	10-27	1.50-1.80	0.2-0.6	0.05-0.21	5.6-7.8	Moderate------	0.15			
86A*:											
Ingalls---------	0-7	2-10	1.25-1.40	6.0-20	0.07-0.10	5.1-7.3	Low-----------	0.17	5	2	.5-3
	7-40	3-15	1.35-1.45	6.0-20	0.05-0.10	5.1-7.3	Low-----------	0.17			
	40-60	2-25	1.45-1.80	0.2-0.6	0.09-0.22	5.6-8.4	Low-----------	0.43			

See footnote at end of table.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodi-bility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
86A*:											
Halfaday----------	0-7	0-10	1.25-1.45	6.0-20	0.05-0.09	4.5-6.5	Low-----------	0.15	5	1	.5-2
	7-30	0-10	1.35-1.50	6.0-20	0.06-0.08	4.5-6.5	Low-----------	0.15			
	30-60	0-10	1.35-1.50	6.0-20	0.04-0.06	5.1-7.3	Low-----------	0.15			
87B-------------- Rousseau	0-3	0-10	1.30-1.55	6.0-20	0.07-0.09	4.5-6.0	Low-----------	0.15	5	1	1-2
	3-25	0-10	1.30-1.60	2.0-20	0.06-0.11	4.5-6.5	Low-----------	0.15			
	25-60	0-10	1.50-1.65	6.0-20	0.05-0.07	5.1-6.5	Low-----------	0.15			
88A*:											
Croswell----------	0-2	0-10	1.30-1.55	6.0-20	0.06-0.09	3.6-6.5	Low-----------	0.15	5	1	.5-2
	2-60	0-10	1.50-1.65	6.0-20	0.05-0.07	5.1-8.4	Low-----------	0.15			
Au Gres----------	0-5	0-8	1.30-1.55	6.0-20	0.07-0.10	3.6-7.3	Low-----------	0.15	5	1	.5-8
	5-60	0-8	1.50-1.70	6.0-20	0.05-0.07	5.1-7.3	Low-----------	0.15			
89A*:											
Kinross----------	0-5	---	0.10-0.35	2.0-6.0	0.35-0.45	3.6-5.0	--------------	----	5	2	>50
	5-42	0-10	1.40-1.70	6.0-20	0.04-0.09	3.6-6.0	Low-----------	0.15			
	42-60	0-10	1.40-1.70	6.0-20	0.04-0.06	4.5-6.5	Low-----------	0.15			
Au Gres----------	0-5	0-8	1.30-1.55	6.0-20	0.07-0.10	3.6-7.3	Low-----------	0.15	5	1	.5-8
	5-60	0-8	1.50-1.70	6.0-20	0.05-0.07	5.1-7.3	Low-----------	0.15			
91B, 91D, 91E---- Rousseau	0-4	0-10	1.30-1.55	6.0-20	0.07-0.09	4.5-6.0	Low-----------	0.15	5	1	1-2
	4-26	0-10	1.30-1.60	6.0-20	0.06-0.08	4.5-6.5	Low-----------	0.15			
	26-60	0-10	1.50-1.65	6.0-20	0.05-0.07	5.1-6.5	Low-----------	0.15			
92A-------------- Biscuit	0-11	0-20	1.30-1.50	0.6-2.0	0.20-0.22	5.1-6.5	Low-----------	0.37	4	3	1-4
	11-16	0-18	1.35-1.65	0.6-2.0	0.17-0.19	5.6-7.3	Low-----------	0.37			
	16-22	0-18	1.35-1.65	0.6-2.0	0.17-0.24	5.6-7.3	Low-----------	0.37			
	22-31	35-60	1.50-1.75	<0.06	0.08-0.10	6.6-7.8	High----------	0.28			
	31-60	40-70	1.50-1.65	<0.06	0.08-0.10	7.4-8.4	High----------	0.28			
93F*:											
Ontonagon--------	0-7	20-27	1.00-1.30	0.6-2.0	0.21-0.23	4.5-6.5	Low-----------	0.43	3	6	1-3
	7-21	60-85	1.35-1.45	<0.06	0.11-0.13	4.5-7.8	High----------	0.28			
	21-60	60-85	1.35-1.45	<0.06	0.11-0.13	7.4-8.4	High----------	0.28			
Pickford---------	0-8	27-40	1.10-1.35	0.2-0.6	0.20-0.24	5.1-7.8	Moderate------	0.37	3	7	2-5
	8-24	35-60	1.40-1.65	<0.06	0.09-0.13	5.1-7.8	Moderate------	0.32			
	24-60	40-60	1.50-1.70	<0.06	0.08-0.12	7.4-8.4	Moderate------	0.32			
94A*:											
Markey-----------	0-33	---	0.15-0.45	0.2-6.0	0.35-0.45	5.6-7.8	--------------	----	4	2	55-85
	33-60	0-10	1.40-1.65	6.0-20	0.03-0.08	5.6-8.4	Low-----------	0.15			
Kinross----------	0-5	---	0.10-0.35	2.0-6.0	0.35-0.45	3.6-5.0	--------------	----	5	2	>50
	5-42	0-10	1.40-1.70	6.0-20	0.04-0.09	3.6-6.0	Low-----------	0.15			
	42-60	0-10	1.40-1.70	6.0-20	0.04-0.06	4.5-6.5	Low-----------	0.15			
Au Gres----------	0-5	0-8	1.30-1.55	6.0-20	0.07-0.10	3.6-7.3	Low-----------	0.15	5	1	.5-8
	5-60	0-8	1.50-1.70	6.0-20	0.05-0.07	5.1-7.3	Low-----------	0.15			
95A-------------- Bowers	0-8	15-27	1.40-1.70	0.6-2.0	0.20-0.22	5.6-7.3	Low-----------	0.32	4	6	1-3
	8-16	35-40	1.45-1.60	0.06-0.2	0.18-0.20	6.1-7.3	Moderate------	0.32			
	16-60	25-40	1.50-1.65	0.06-0.6	0.18-0.22	7.4-8.4	Moderate------	0.32			

See footnote at end of table.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
96B*:											
Velvet	0-3	2-10	1.35-1.65	0.6-2.0	0.07-0.12	5.1-6.5	Low	0.10	3	8	1-3
	3-16	2-10	1.35-1.65	6.0-20	0.05-0.12	5.1-7.3	Low	0.10			
	16-41	5-15	1.80-2.10	<0.06	0.02-0.04	5.1-7.3	Low	0.17			
	41-60	5-15	1.35-1.65	0.6-2.0	0.02-0.04	6.1-7.3	Low	0.17			
Westbury	0-1	3-12	0.90-1.20	0.6-2.0	0.08-0.16	3.6-6.0	Low	0.24	3	8	2-8
	1-13	3-12	1.40-1.70	0.6-2.0	0.07-0.15	3.6-6.0	Low	0.24			
	13-45	3-12	1.70-2.00	<0.06	0.02-0.06	4.5-6.0	Low	0.24			
	45-60	3-12	1.70-2.00	<0.06	0.02-0.06	5.1-7.3	Low	0.24			
97A	0-9	2-10	1.20-1.65	0.6-2.0	0.20-0.22	5.1-7.8	Low	0.37	5	3	1-4
Wega	9-60	1-15	1.60-1.70	0.2-0.6	0.08-0.18	5.6-8.4	Low	0.37			
98	0-8	2-18	1.25-1.70	0.6-2.0	0.20-0.22	5.6-7.8	Low	0.37	5	5	2-4
Ermatinger	8-12	5-25	1.55-1.80	0.6-2.0	0.21-0.22	5.6-7.8	Low	0.37			
	12-21	2-18	1.45-1.80	0.6-2.0	0.17-0.19	7.4-8.4	Low	0.37			
	21-60	2-20	1.70-1.80	0.6-2.0	0.17-0.22	7.4-8.4	Low	0.37			
99A	0-1	3-12	0.90-1.20	0.6-2.0	0.08-0.16	3.6-6.0	Low	0.24	3	8	2-8
Westbury	1-13	3-12	1.40-1.70	0.6-2.0	0.07-0.15	3.6-6.0	Low	0.24			
	13-45	3-12	1.70-2.00	<0.06	0.02-0.06	4.5-6.0	Low	0.24			
	45-60	3-12	1.70-2.00	<0.06	0.02-0.06	5.1-7.3	Low	0.24			
101	0-25	---	0.30-0.55	0.2-0.6	0.35-0.45	5.6-7.8	---	---	4	2	55-75
Chippeny	25-35	5-20	1.45-1.75	0.06-2.0	0.04-0.19	6.6-8.4	Low	0.24			
	35-39	---	---	---	---	---	---	---			
102*:											
Kinross	0-5	---	0.10-0.35	2.0-6.0	0.35-0.45	3.6-5.0	---	---	5	2	>50
	5-42	0-10	1.40-1.70	6.0-20	0.04-0.09	3.6-6.0	Low	0.15			
	42-60	0-10	1.40-1.70	6.0-20	0.04-0.06	4.5-6.5	Low	0.15			
Dawson	0-6	---	0.15-0.30	>6.0	0.55-0.65	3.6-4.4	---	---	4	7	65-85
	6-18	---	0.15-0.40	0.2-6.0	0.35-0.45	3.6-4.4	---	---			
	18-60	0-10	1.55-1.75	6.0-20	0.03-0.10	4.5-6.5	Low	0.15			
103D*:											
Velvet	0-3	2-10	1.35-1.65	0.6-2.0	0.07-0.12	5.1-6.5	Low	0.10	3	8	1-3
	3-16	2-10	1.35-1.65	6.0-20	0.05-0.12	5.1-7.3	Low	0.10			
	16-41	5-15	1.80-2.10	<0.06	0.02-0.04	5.1-7.3	Low	0.17			
	41-60	5-15	1.35-1.65	0.6-2.0	0.02-0.04	6.1-7.3	Low	0.17			
Rockbottom	0-10	10-27	1.35-1.55	0.6-2.0	0.13-0.16	5.1-6.5	Low	0.28	3	8	1-3
	10-17	27-35	1.45-1.60	0.2-0.6	0.15-0.19	5.6-7.3	Moderate	0.43			
	17-29	25-35	1.50-1.65	0.2-0.6	0.07-0.09	6.1-7.8	Low	0.24			
	29-60	2-10	1.55-1.80	0.6-2.0	0.08-0.10	6.1-7.8	Low	0.20			
103E*:											
Velvet	0-3	2-10	1.35-1.65	0.6-2.0	0.07-0.12	5.1-6.5	Low	0.10	3	8	1-3
	3-16	2-10	1.35-1.65	6.0-20	0.05-0.12	5.1-7.3	Low	0.10			
	16-41	5-15	1.80-2.10	<0.06	0.02-0.04	5.1-7.3	Low	0.17			
	41-60	5-15	1.35-1.65	0.6-2.0	0.02-0.04	6.1-7.3	Low	0.17			
Rockbottom	0-10	10-27	1.35-1.55	0.6-2.0	0.13-0.16	5.1-6.5	Low	0.28	3	8	1-3
	10-17	35-45	1.45-1.60	0.2-0.6	0.15-0.19	5.6-7.3	Moderate	0.43			
	17-29	25-35	1.50-1.65	0.2-0.6	0.07-0.09	6.1-7.8	Moderate	0.24			
	29-60	2-10	1.55-1.80	0.6-2.0	0.08-0.10	6.1-7.8	Low	0.20			
104B, 104D, 104F	0-5	3-12	1.20-1.60	0.6-2.0	0.15-0.18	3.6-6.0	Low	0.24	4	3	1-2
Amasa	5-22	3-12	1.20-1.70	0.6-2.0	0.14-0.22	3.6-6.0	Low	0.37			
	22-60	0-5	1.50-1.65	>20	0.02-0.04	3.6-6.5	Low	0.10			

See footnote at end of table.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
106A*:											
Potagannissing--	0-4	10-18	1.35-1.60	0.6-2.0	0.09-0.16	6.6-7.8	Low----------	0.24	1	8	2-4
	4-7	10-18	1.40-1.70	0.6-2.0	0.09-0.16	7.9-8.4	Low----------	0.24			
	7-11	---	---	---	---	---	-------------	----			
Rock outcrop.											
107B------------- Oldman	0-5	5-18	1.30-1.65	0.6-2.0	0.07-0.11	4.5-6.5	Low----------	0.17	2	8	1-3
	5-19	5-18	1.30-1.65	0.6-2.0	0.06-0.08	4.5-6.5	Low----------	0.24			
	19-46	5-18	1.80-2.15	<0.06	0.05-0.07	4.5-6.5	Low----------	0.20			
	46-60	5-18	1.30-1.65	0.2-0.6	0.06-0.08	4.5-6.5	Low----------	0.20			
108D*:											
Shelter---------	0-6	4-20	1.15-1.65	0.6-2.0	0.12-0.15	6.6-8.4	Low----------	0.24	3	8	1-4
	6-12	4-20	1.30-1.70	0.2-2.0	0.06-0.10	7.9-9.0	Low----------	0.20			
	12-60	4-20	1.80-2.10	<0.06	0.02-0.04	7.9-9.0	Low----------	0.20			
Alpena----------	0-16	5-15	1.25-1.55	2.0-20	0.05-0.14	6.6-8.4	Low----------	0.10	2	8	2-4
	16-60	0-10	1.25-1.65	>20	0.02-0.04	7.9-8.4	Low----------	0.10			
111-------------- Gutport	0-13	0	0.15-0.45	0.2-6.0	0.35-0.45	6.1-7.3	-------------	----	3	2	>90
	13-17	20-60	1.40-1.65	0.06-0.2	0.11-0.20	6.6-7.8	Moderate-----	0.32			
	17-27	35-60	1.40-1.65	0.06-0.2	0.09-0.11	6.6-7.8	Moderate-----	0.32			
	27-31	---	---	---	---	---	-------------	----			
112-------------- Soo	0-7	27-40	1.10-1.50	0.6-2.0	0.21-0.23	6.1-7.3	Moderate-----	0.43	3	7	2-5
	7-17	27-40	1.40-1.70	0.06-0.2	0.18-0.20	6.1-7.8	Moderate-----	0.43			
	17-60	18-40	1.50-1.70	0.06-0.2	0.18-0.20	7.9-8.4	Moderate-----	0.43			
113-------------- Ruse	0-5	5-15	1.10-1.30	0.6-6.0	0.13-0.20	6.1-7.8	Low----------	0.17	2	3	10-15
	5-14	10-25	1.50-1.70	0.6-6.0	0.10-0.20	6.1-7.8	Low----------	0.24			
	14-18	---	---	---	---	---	-------------	----			
114B, 114D------- Velvet	0-3	2-10	1.35-1.65	0.6-2.0	0.07-0.12	5.1-6.5	Low----------	0.10	3	8	1-3
	3-16	2-10	1.35-1.65	6.0-20	0.05-0.12	5.1-7.3	Low----------	0.10			
	16-41	5-15	1.80-2.10	<0.06	0.02-0.04	5.1-7.3	Low----------	0.17			
	41-60	5-15	1.35-1.65	0.6-2.0	0.02-0.04	6.1-7.3	Low----------	0.17			
116*. Udorthents											
117B------------- Manistee	0-9	0-10	1.35-1.60	6.0-20	0.07-0.09	4.5-7.3	Low----------	0.15	4	1	2-4
	9-21	2-12	1.35-1.60	6.0-20	0.06-0.10	5.1-7.3	Low----------	0.17			
	21-35	35-60	1.60-1.70	<0.06	0.08-0.12	5.1-7.3	High---------	0.32			
	35-60	35-60	1.60-1.70	0.06-0.2	0.08-0.16	6.6-8.4	High---------	0.32			
117D, 117F------- Manistee	0-9	0-10	1.35-1.60	6.0-20	0.07-0.09	4.5-7.3	Low----------	0.15	4	1	2-4
	9-21	2-12	1.35-1.60	6.0-20	0.06-0.10	5.1-7.3	Low----------	0.17			
	21-35	35-60	1.50-1.70	<0.06	0.08-0.12	5.1-7.3	High---------	0.32			
	35-60	35-60	1.60-1.75	0.06-0.2	0.08-0.16	6.6-8.4	High---------	0.32			
119-------------- Gogomain	0-6	10-18	1.25-1.50	2.0-6.0	0.20-0.24	5.6-7.3	Low----------	0.37	4	3	2-4
	6-37	0-18	1.35-1.65	2.0-6.0	0.07-0.22	6.6-8.4	Low----------	0.28			
	37-60	40-70	1.50-1.75	<0.06	0.08-0.12	7.4-8.4	High---------	0.28			
121B------------- Rockbottom	0-10	10-27	1.35-1.55	0.6-2.0	0.13-0.16	5.1-6.5	Low----------	0.28	3	8	1-3
	10-17	35-45	1.45-1.60	0.2-0.6	0.15-0.19	5.6-7.3	Moderate-----	0.43			
	17-29	25-35	1.50-1.65	0.2-0.6	0.07-0.09	6.1-7.8	Low----------	0.24			
	29-60	2-10	1.55-1.80	0.6-2.0	0.08-0.10	6.1-7.8	Low----------	0.20			
122*. Pits											

See footnote at end of table.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
123B	0-8	0-10	1.30-1.60	6.0-20	0.07-0.09	4.5-6.5	Low	0.15	5	1	1-3
Ocqueoc	8-22	0-15	1.30-1.60	6.0-20	0.06-0.12	4.5-6.5	Low	0.15			
	22-60	10-27	1.50-1.80	0.2-0.6	0.05-0.21	5.6-7.8	Moderate	0.15			
124D	0-16	5-15	1.25-1.55	2.0-20	0.05-0.14	6.6-8.4	Low	0.10	2	8	2-4
Alpena	16-60	0-10	1.25-1.65	>20	0.02-0.04	7.9-8.4	Low	0.10			
125B*:											
Croswell	0-2	0-10	1.30-1.55	6.0-20	0.06-0.09	3.6-6.5	Low	0.15	5	1	.5-2
	2-60	0-10	1.50-1.65	6.0-20	0.05-0.07	5.1-8.4	Low	0.15			
Markey	0-33	---	0.15-0.45	0.2-6.0	0.35-0.45	5.6-7.8	---	---	4	2	55-85
	33-60	0-10	1.40-1.65	6.0-20	0.03-0.08	5.6-8.4	Low	0.15			
126	0-7	15-27	1.10-1.35	0.6-2.0	0.20-0.24	5.1-7.8	Low	0.43	3	5	2-15
Pickford	7-16	35-60	1.40-1.65	<0.06	0.09-0.13	5.1-7.8	Moderate	0.32			
	16-60	40-60	1.50-1.70	<0.06	0.08-0.12	7.4-8.4	Moderate	0.32			
127	0-5	---	0.30-0.40	0.6-2.0	0.35-0.45	5.1-6.0	Low	---	5	2	>25
Gay	5-10	5-15	1.15-1.60	0.6-2.0	0.07-0.14	5.1-6.0	Low	0.28			
	10-24	5-18	1.30-1.80	0.6-2.0	0.10-0.18	5.1-6.0	Low	0.28			
	24-60	5-18	1.80-1.95	0.6-2.0	0.09-0.17	5.1-7.3	Low	0.28			
128F*:											
Alcona	0-3	2-15	1.30-1.60	0.6-6.0	0.10-0.14	4.5-7.3	Low	0.17	5	2	1-3
	3-17	5-20	1.35-1.70	0.6-6.0	0.10-0.17	4.5-7.3	Low	0.17			
	17-55	5-18	1.35-1.70	0.6-6.0	0.08-0.17	5.1-7.8	Low	0.17			
	55-60	5-18	1.35-1.70	0.6-2.0	0.08-0.20	5.1-7.8	Low	0.24			
Markey	0-33	---	0.15-0.45	0.2-6.0	0.35-0.45	5.6-7.8	---	---	4	2	55-85
	33-60	0-10	1.40-1.65	6.0-20	0.03-0.08	5.6-8.4	Low	0.15			
129A	0-9	15-27	1.00-1.60	0.6-2.0	0.20-0.24	5.1-7.3	Moderate	0.37	3	5	3-4
Rudyard	9-21	60-85	1.10-1.40	<0.06	0.11-0.13	5.1-7.3	High	0.28			
	21-60	60-80	1.35-1.45	<0.06	0.11-0.13	7.4-8.4	High	0.28			
130A*:											
Rudyard	0-6	27-40	1.00-1.60	0.2-0.6	0.21-0.23	5.1-7.3	Moderate	0.37	3	4	3-4
	6-17	60-85	1.10-1.40	<0.06	0.11-0.13	5.1-7.3	High	0.28			
	17-60	60-80	1.35-1.45	<0.06	0.11-0.13	7.4-8.4	High	0.28			
Pickford	0-8	27-40	1.10-1.35	0.2-0.6	0.20-0.24	5.1-7.8	Moderate	0.43	3	7	10-15
	8-24	35-60	1.40-1.65	<0.06	0.09-0.13	5.1-7.8	Moderate	0.32			
	24-60	40-60	1.50-1.70	<0.06	0.08-0.12	7.4-8.4	Moderate	0.32			
132B, 132F	0-3	12-18	1.35-1.60	0.6-2.0	0.20-0.24	5.1-6.5	Low	0.32	4	3	1-3
Sugar	3-34	5-18	1.35-1.60	0.6-2.0	0.17-0.22	6.1-7.8	Low	0.24			
	34-45	40-70	1.60-1.70	<0.06	0.08-0.12	7.4-8.4	High	0.32			
	45-60	40-70	1.60-1.70	<0.06	0.08-0.12	7.4-8.4	High	0.32			
133	0-12	---	0.13-0.42	0.6-6.0	0.35-0.55	4.5-7.8	---	---	4	2	>21
Dora	12-25	---	0.13-0.42	0.6-6.0	0.35-0.55	4.5-7.8	---	---			
	25-60	35-60	1.40-1.65	<0.06	0.10-0.20	6.1-8.4	High	0.32			
135B*:											
Longrie	0-9	5-15	1.10-1.60	2.0-6.0	0.10-0.16	5.1-7.3	Low	0.24	4	3	1-3
	9-27	10-18	1.35-1.65	0.6-2.0	0.09-0.19	5.1-7.3	Low	0.32			
	27-31	10-18	1.35-1.65	0.6-2.0	0.09-0.18	6.6-7.8	Low	0.32			
	31-35	---	---	---	---	---	---	---			

See footnote at end of table.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors K	Erosion factors T	Wind erodibility group	Organic matter
	In	Pct	g/cc	In/hr	In/in	pH					Pct
135B*:											
Posen-----------	0-3	5-20	1.30-1.60	2.0-6.0	0.08-0.14	5.6-7.3	Low----------	0.17	5	8	1-3
	3-16	8-20	1.35-1.65	0.6-2.0	0.07-0.11	5.6-7.3	Low----------	0.20			
	16-60	8-20	1.60-1.70	0.6-2.0	0.07-0.11	7.9-8.4	Low----------	0.20			
136A*:											
Westbury--------	0-1	3-12	0.90-1.20	0.6-2.0	0.08-0.16	3.6-6.0	Low----------	0.24	3	8	2-8
	1-13	3-12	1.40-1.70	0.6-2.0	0.07-0.15	3.6-6.0	Low----------	0.24			
	13-45	3-12	1.70-2.00	<0.2	0.02-0.06	4.5-6.0	Low----------	0.24			
	45-60	3-12	1.70-2.00	<0.2	0.02-0.06	5.1-7.3	Low----------	0.24			
Gay-------------	0-5	---	0.30-0.40	0.6-2.0	0.35-0.45	5.1-6.0	Low----------	----	5	2	>25
	5-10	5-15	1.15-1.60	0.6-2.0	0.07-0.14	5.1-6.0	Low----------	0.28			
	10-24	5-18	1.30-1.80	0.6-2.0	0.10-0.18	5.1-6.0	Low----------	0.28			
	24-60	5-18	1.80-1.95	0.6-2.0	0.09-0.17	5.1-7.3	Low----------	0.28			
137A*:											
Kinross---------	0-5	---	0.10-0.35	2.0-6.0	0.35-0.45	3.6-5.0	-------------	----	5	2	>50
	5-42	0-10	1.40-1.70	6.0-20	0.04-0.09	3.6-6.0	Low----------	0.15			
	42-60	0-10	1.40-1.70	6.0-20	0.04-0.06	4.5-6.5	Low----------	0.15			
Wainola---------	0-10	0-10	1.35-1.50	6.0-20	0.07-0.09	4.5-6.5	Low----------	0.15	5	1	2-4
	10-39	2-12	1.35-1.45	6.0-20	0.06-0.11	4.5-6.5	Low----------	0.15			
	39-60	0-10	1.25-1.50	6.0-20	0.05-0.07	5.1-7.3	Low----------	0.15			
138B*:											
Rousseau--------	0-2	0-10	1.35-1.65	6.0-20	0.07-0.09	4.5-6.0	Low----------	0.15	5	1	1-2
	2-17	0-10	1.30-1.70	6.0-20	0.06-0.08	4.5-6.0	Low----------	0.15			
	17-60	0-10	1.55-1.65	6.0-20	0.06-0.08	5.1-6.5	Low----------	0.15			
Urban land.											
139A*:											
Rudyard---------	0-6	27-40	1.00-1.60	0.2-0.6	0.21-0.23	5.1-7.3	Moderate-----	0.37	3	4	3-4
	6-17	60-85	1.10-1.40	<0.06	0.11-0.13	5.1-7.3	High---------	0.28			
	17-60	60-80	1.35-1.45	<0.06	0.11-0.13	7.4-8.4	High---------	0.28			
Urban land.											
143-------------- Burleigh	0-7	0-8	1.35-1.50	2.0-6.0	0.08-0.12	6.1-7.8	Low----------	0.17	5	2	2-3
	7-21	2-10	1.40-1.55	6.0-20	0.06-0.09	6.1-7.8	Low----------	0.17			
	21-60	10-28	1.45-1.80	0.2-0.6	0.05-0.20	6.5-8.4	Low----------	0.43			
144*:											
Urban land.											
Udorthents.											
145A*:											
Gaastra---------	0-8	10-18	1.40-1.60	0.6-2.0	0.20-0.24	4.5-6.5	Low----------	0.37	5	5	3-4
	8-41	6-18	1.40-1.60	0.6-2.0	0.14-0.22	5.1-6.5	Low----------	0.37			
	41-60	10-18	1.50-1.70	0.2-0.6	0.20-0.22	5.1-7.3	Low----------	0.37			
Gogomain--------	0-6	10-18	1.25-1.50	2.0-6.0	0.20-0.24	5.6-7.3	Low----------	0.37	4	3	2-4
	6-37	0-18	1.35-1.65	2.0-6.0	0.07-0.22	6.6-8.4	Low----------	0.28			
	37-60	40-70	1.50-1.75	<0.06	0.08-0.12	7.4-8.4	High---------	0.28			
Ingalls---------	0-7	2-10	1.25-1.40	6.0-20	0.07-0.10	5.1-7.3	Low----------	0.17	5	2	.5-3
	7-40	3-15	1.35-1.45	6.0-20	0.05-0.10	5.1-7.3	Low----------	0.17			
	40-60	2-25	1.45-1.80	0.2-0.6	0.09-0.22	5.6-8.4	Low----------	0.43			

See footnote at end of table.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
146A*:											
Allendale-------	0-5	0-12	1.25-1.40	6.0-20	0.09-0.12	4.5-7.3	Low-----------	0.17	4	2	1-3
	5-31	0-15	1.35-1.45	6.0-20	0.06-0.10	4.5-7.3	Low-----------	0.17			
	31-60	40-60	1.45-1.70	<0.06	0.08-0.12	6.1-8.4	Moderate------	0.32			
Fibre-----------	0-5	---	0.30-0.45	0.2-6.0	0.35-0.45	4.5-5.0	--------------	----	3	2	55-85
	5-17	0-10	1.35-1.50	6.0-20	0.06-0.11	4.5-7.3	Low-----------	0.15			
	17-19	0-20	1.40-1.65	2.0-20	0.09-0.17	5.1-7.3	Low-----------	0.20			
	19-27	40-60	1.50-1.70	<0.06	0.09-0.20	6.6-7.8	High----------	0.28			
	27-60	25-60	1.50-1.70	<0.06	0.08-0.12	7.4-8.4	High----------	0.28			
147B, 147D------- Shelter	0-6	4-20	1.15-1.65	0.6-2.0	0.12-0.15	6.6-8.4	Low-----------	0.24	3	8	1-4
	6-12	4-20	1.30-1.70	0.2-2.0	0.06-0.10	7.9-9.0	Low-----------	0.20			
	12-60	4-20	1.80-2.10	<0.06	0.02-0.04	7.9-9.0	Low-----------	0.20			
148B*:											
Longrie---------	0-9	10-20	1.30-1.50	0.6-2.0	0.20-0.24	5.1-7.3	Low-----------	0.32	4	5	1-3
	9-27	10-18	1.35-1.65	0.6-2.0	0.09-0.19	5.1-7.3	Low-----------	0.32			
	27-31	10-18	1.35-1.65	0.6-2.0	0.09-0.18	6.6-7.8	Low-----------	0.32			
	31-35	---	---	---	---	---	--------------	----			
Rock outcrop.											
149B------------- Kalkaska	0-7	0-10	1.25-1.45	6.0-20	0.05-0.09	3.6-6.0	Low-----------	0.10	5	8	1-4
	7-9	0-15	1.35-1.45	6.0-20	0.06-0.08	3.6-6.0	Low-----------	0.15			
	9-25	0-10	1.35-1.45	6.0-20	0.06-0.08	4.5-6.0	Low-----------	0.15			
	25-60	0-10	1.35-1.50	6.0-20	0.04-0.06	4.5-6.5	Low-----------	0.15			
150-------------- Fibre	0-5	---	0.30-0.45	0.2-6.0	0.35-0.45	4.5-5.0	--------------	----	3	2	55-85
	5-17	0-10	1.35-1.50	6.0-20	0.06-0.11	4.5-7.3	Low-----------	0.15			
	17-19	0-20	1.40-1.65	2.0-20	0.09-0.17	5.1-7.3	Low-----------	0.20			
	19-27	40-60	1.50-1.70	<0.06	0.09-0.20	6.6-7.8	High----------	0.28			
	27-60	25-60	1.50-1.70	<0.06	0.08-0.12	7.4-8.4	High----------	0.28			
151-------------- Beavertail	0-8	---	0.30-0.40	0.6-6.0	0.35-0.45	7.4-8.4	--------------	----	3	2	40-75
	8-16	10-20	1.30-1.60	0.6-2.0	0.06-0.15	7.4-8.4	Low-----------	0.17			
	16-29	10-20	1.60-1.80	0.2-0.6	0.05-0.12	7.4-8.4	Low-----------	0.17			
	29-60	10-20	1.80-2.10	0.06-0.2	0.01-0.04	7.4-8.4	Low-----------	0.17			
152-------------- Grousehaven	0-15	---	0.10-0.25	0.2-6.0	0.35-0.45	6.6-8.4	Low-----------	----	2	2	>25
	15-60	---	0.05-0.20	<0.2	0.20-0.22	7.4-8.4	Low-----------	----			
153*. Dumps											
154F*:											
Dawson----------	0-6	---	0.15-0.30	>6.0	0.55-0.65	3.6-4.4	--------------	----	4	7	65-85
	6-18	---	0.15-0.40	0.2-6.0	0.35-0.45	3.6-4.4	--------------	----			
	18-60	0-10	1.55-1.75	6.0-20	0.03-0.10	4.5-6.5	Low-----------	0.15			
Deer Park-------	0-8	0-10	1.30-1.55	6.0-20	0.04-0.07	5.1-6.0	Low-----------	0.15	5	1	.5-1
	8-51	0-10	1.40-1.60	6.0-20	0.03-0.06	5.1-6.5	Low-----------	0.15			
	51-60	0-10	1.40-1.55	6.0-20	0.03-0.05	5.1-6.5	Low-----------	0.15			
Wainola---------	0-5	0-10	1.35-1.50	6.0-20	0.07-0.09	4.5-6.5	Low-----------	0.15	5	1	2-4
	5-24	2-12	1.35-1.45	6.0-20	0.06-0.11	4.5-6.5	Low-----------	0.15			
	24-60	0-10	1.25-1.50	6.0-20	0.05-0.07	5.1-7.3	Low-----------	0.15			

See footnote at end of table.

TABLE 18.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Soil name and map symbol	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Wind erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
155B*:											
Allendale-------	0-5	0-12	1.25-1.40	6.0-20	0.09-0.12	4.5-7.3	Low----------	0.17	4	2	1-3
	5-31	0-15	1.35-1.45	6.0-20	0.06-0.10	4.5-7.3	Low----------	0.17			
	31-60	40-60	1.45-1.70	<0.06	0.08-0.12	6.1-8.4	Moderate-----	0.32			
Posen-----------	0-3	5-20	1.30-1.60	2.0-6.0	0.08-0.14	5.6-7.3	Low----------	0.17	5	8	1-3
	3-16	8-20	1.35-1.65	0.6-2.0	0.07-0.11	5.6-7.3	Low----------	0.20			
	16-60	8-20	1.60-1.70	0.6-2.0	0.07-0.11	7.9-8.4	Low----------	0.20			
Pickford--------	0-8	27-40	1.10-1.35	0.2-0.6	0.20-0.24	5.1-7.8	Moderate-----	0.43	3	7	10-15
	8-24	35-60	1.40-1.65	<0.06	0.09-0.13	5.1-7.8	Moderate-----	0.32			
	24-60	40-60	1.50-1.70	<0.06	0.08-0.12	7.4-8.4	Moderate-----	0.32			
156A*:											
Rockcut---------	0-4	5-15	1.15-1.60	6.0-20	0.03-0.12	5.1-6.0	Low----------	0.15	2	8	2-4
	4-14	0-8	1.15-1.60	6.0-20	0.03-0.06	5.1-6.0	Low----------	0.10			
	14-17	8-35	1.35-1.55	0.6-2.0	0.05-0.18	5.6-6.5	Low----------	0.28			
	17-60	10-50	1.40-1.70	0.2-0.6	0.16-0.20	6.6-8.4	Moderate-----	0.32			
Pinconning------	0-8	2-12	1.00-1.50	2.0-6.0	0.10-0.12	5.6-7.8	Low----------	0.17	4	2	4-6
	8-30	2-12	1.40-1.55	6.0-20	0.06-0.11	6.1-7.8	Low----------	0.17			
	30-60	35-60	1.50-1.70	<0.2	0.08-0.12	7.4-8.4	High---------	0.32			
159B*, 159F*:											
Amasa-----------	0-5	3-12	1.20-1.60	0.6-2.0	0.15-0.18	3.6-6.0	Low----------	0.24	4	3	1-2
	5-22	3-12	1.20-1.70	0.6-2.0	0.14-0.22	3.6-6.0	Low----------	0.37			
	22-60	0-5	1.50-1.65	>20	0.02-0.04	3.6-6.5	Low----------	0.10			
Sugar-----------	0-3	12-18	1.35-1.60	0.6-2.0	0.20-0.24	5.1-6.5	Low----------	0.32	4	3	1-3
	3-34	5-18	1.35-1.60	0.6-2.0	0.17-0.22	6.1-7.8	Low----------	0.24			
	34-45	40-70	1.60-1.70	<0.06	0.08-0.12	7.4-8.4	High---------	0.32			
	45-60	40-70	1.60-1.70	<0.06	0.08-0.12	7.4-8.4	High---------	0.32			

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 19.--SOIL FEATURES

(The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
10B, 10D Ontonagon	>60	---	---	---	Moderate	High	Low.
10F Ontonagon	>60	---	---	---	Moderate	High	Moderate.
11A Rudyard	>60	---	---	---	Moderate	High	Low.
12 Pickford	>60	---	---	---	Moderate	High	Low.
13B, 13D Alcona	>60	---	---	---	Moderate	Moderate	Low.
13F Alcona	>60	---	---	---	Moderate	Low	Low.
14A Gaastra	>60	---	---	---	High	Moderate	Moderate.
15B, 15D, 15E, 15F Rousseau	>60	---	---	---	Low	Low	Moderate.
17D, 17F Deer Park	>60	---	---	---	Low	Low	Low.
18B, 18D, 18E Rubicon	>60	---	---	---	Low	Low	High.
19B, 19D, 19E, 19F Kalkaska	>60	---	---	---	Low	Low	High.
20A Croswell	>60	---	---	---	Low	Low	Moderate.
21A Au Gres	>60	---	---	---	Moderate	Low	Moderate.
22 Kinross	>60	---	---	---	Moderate	High	Moderate.
23 Roscommon	>60	---	---	---	Moderate	High	Low.
25B, 25D Guardlake	>60	---	---	---	Low	Low	Low.
27B Emmet	>60	---	---	---	Moderate	Low	Moderate.
28B Longrie	20-40	Hard	---	---	Moderate	Low	Low.
29A Solona	>60	---	---	---	High	High	Low.

See footnote at end of table.

TABLE 19.--SOIL FEATURES--Continued

Soil name and map symbol	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
32A--------------------- Allendale	>60	---	---	---	Moderate--------	High------------	Moderate.
33*. Pits							
34. Entisols							
35*: Histosols.							
Aquents.							
36*: Markey------------------	>60	---	---	25-30	High------------	High------------	Low.
Carbondale--------------	>60	---	---	43-54	High------------	High------------	Moderate.
37*: Dawson------------------	>60	---	---	30-36	High------------	High------------	High.
Loxley------------------	>60	---	---	50-55	High------------	High------------	High.
38F*: Deer Park---------------	>60	---	---	---	Low-------------	Low-------------	Low.
Kinross-----------------	>60	---	---	---	Moderate--------	High------------	Moderate.
39D*: Au Gres-----------------	>60	---	---	---	Moderate--------	Low-------------	Moderate.
Dawson------------------	>60	---	---	30-36	High------------	High------------	High.
Rubicon-----------------	>60	---	---	---	Low-------------	Low-------------	High.
40A*: Rudyard-----------------	>60	---	---	---	Moderate--------	High------------	Low.
Allendale---------------	>60	---	---	---	Moderate--------	High------------	Moderate.
41D*, 41F*: Summerville-------------	10-20	Hard	---	---	Moderate--------	Low-------------	Low.
Rock outcrop.							
42D*: Emmet-------------------	>60	---	---	---	Moderate--------	Low-------------	Moderate.
Kalkaska----------------	>60	---	---	---	Low-------------	Low-------------	High.
44B, 44D, 44E----------- Posen	>60	---	---	---	Moderate--------	Low-------------	Moderate.
46B, 46D, 46E----------- Pence	>60	---	---	---	Low-------------	Low-------------	Moderate.
48E*: Wainola-----------------	>60	---	---	---	Moderate--------	Low-------------	Moderate.

See footnote at end of table.

TABLE 19.--SOIL FEATURES--Continued

Soil name and map symbol	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
48E*:							
Kinross	>60	---	---	---	Moderate	High	Moderate.
Rousseau	>60	---	---	---	Low	Low	Moderate.
49A Wainola	>60	---	---	---	Moderate	Low	Moderate.
50 Deford	>60	---	---	---	Moderate	Low	Moderate.
52A Ingalls	>60	---	---	---	Moderate	Moderate	Moderate.
53B Menominee	>60	---	---	---	Low	Low	Moderate.
56A Ensign	10-20	Hard	---	---	High	High	Low.
57B*:							
Summerville	10-20	Hard	---	---	Moderate	Low	Low.
Longrie	20-40	Hard	---	---	Moderate	Low	Low.
61A Halfaday	>60	---	---	---	Low	Low	High.
67B*:							
Duel	20-40	Hard	---	---	Low	Low	Moderate.
Rock outcrop.							
68 Pinconning	>60	---	---	---	Moderate	High	Moderate.
78B Waiska	>60	---	---	---	Low	Low	Moderate.
79B*, 79D*:							
Kalkaska	>60	---	---	---	Low	Low	High.
Manistee	>60	---	---	---	Low	High	Moderate.
80B Superior	>60	---	---	---	Moderate	Moderate	Moderate.
83A*:							
Allendale	>60	---	---	---	Moderate	High	Moderate.
Croswell	>60	---	---	---	Low	Low	Moderate.
84B*, 84D*:							
Rousseau	>60	---	---	---	Low	Low	Moderate.
Alcona	>60	---	---	---	Moderate	Moderate	Low.
84F*:							
Rousseau	>60	---	---	---	Low	Low	Moderate.

See footnote at end of table.

TABLE 19.--SOIL FEATURES--Continued

Soil name and map symbol	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
84F*:							
Alcona	>60	---	---	---	Moderate	Low	Low.
85B*:							
Kalkaska	>60	---	---	---	Low	Low	High.
Ocqueoc	>60	---	---	---	Low	Low	Moderate.
86A*:							
Ingalls	>60	---	---	---	Moderate	Moderate	Moderate.
Halfaday	>60	---	---	---	Low	Low	High.
87B Rousseau	>60	---	---	---	Low	Low	Moderate.
88A*:							
Croswell	>60	---	---	---	Low	Low	Moderate.
Au Gres	>60	---	---	---	Moderate	Low	Moderate.
89A*:							
Kinross	>60	---	---	---	Moderate	High	Moderate.
Au Gres	>60	---	---	---	Moderate	Low	Moderate.
91B, 91D, 91E Rousseau	>60	---	---	---	Low	Low	Moderate.
92A Biscuit	>60	---	---	---	High	Moderate	Low.
93F*:							
Ontonagon	>60	---	---	---	Moderate	High	Moderate.
Pickford	>60	---	---	---	Moderate	High	Low.
94A*:							
Markey	>60	---	---	25-30	High	High	Low.
Kinross	>60	---	---	---	Moderate	High	Moderate.
Au Gres	>60	---	---	---	Moderate	Low	Moderate.
95A Bowers	>60	---	---	---	High	High	Low.
96B*:							
Velvet	>60	---	---	---	Low	Low	Moderate.
Westbury	>60	---	---	---	High	Moderate	High.
97A Wega	>60	---	---	---	High	Moderate	Low.
98 Ermatinger	>60	---	---	---	High	High	Low.
99A Westbury	>60	---	---	---	High	Moderate	High.

See footnote at end of table.

TABLE 19.--SOIL FEATURES--Continued

Soil name and map symbol	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
101 Chippeny	20-50	Hard	---	15-18	High	High	Moderate.
102*:							
Kinross	>60	---	---	---	Moderate	High	Moderate.
Dawson	>60	---	---	30-36	High	High	High.
103D*, 103E*:							
Velvet	>60	---	---	---	Low	Low	Moderate.
Rockbottom	>60	---	---	---	Moderate	Moderate	Low.
104B, 104D, 104F Amasa	>60	---	---	---	Moderate	Low	Moderate.
106A*:							
Potagannissing	5-10	Hard	---	---	High	High	Low.
Rock outcrop.							
107B Oldman	>60	---	---	---	Moderate	Moderate	Moderate.
108D*:							
Shelter	>60	---	---	---	High	High	Low.
Alpena	>60	---	---	---	Low	Low	Low.
111 Gutport	20-40	Hard	---	9-15	High	High	Low.
112 Soo	>60	---	---	---	High	High	Low.
113 Ruse	10-20	Hard	---	---	High	High	Low.
114B, 114D Velvet	>60	---	---	---	Low	Low	Moderate.
116*. Udorthents							
117B, 117D, 117F Manistee	>60	---	---	---	Low	High	Moderate.
119 Gogomain	>60	---	---	---	High	High	Low.
121B Rockbottom	>60	---	---	---	Moderate	Moderate	Low.
122*. Pits							
123B Ocqueoc	>60	---	---	---	Low	Low	Moderate.

See footnote at end of table.

TABLE 19.--SOIL FEATURES--Continued

Soil name and map symbol	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
124D Alpena	>60	---	---	---	Low	Low	Low.
125B*:							
Croswell	>60	---	---	---	Low	Low	Moderate.
Markey	>60	---	---	25-30	High	High	Low.
126 Pickford	>60	---	---	---	Moderate	High	Low.
127 Gay	>60	---	---	---	High	High	Moderate.
128F*:							
Alcona	>60	---	---	---	Moderate	Low	Low.
Markey	>60	---	---	25-30	High	High	Low.
129A Rudyard	>60	---	---	---	Moderate	High	Low.
130A*:							
Rudyard	>60	---	---	---	Moderate	High	Low.
Pickford	>60	---	---	---	Moderate	High	Low.
132B, 132F Sugar	>60	---	---	---	High	High	Low.
133 Dora	>60	---	4-12	25-30	High	High	Moderate.
135B*:							
Longrie	20-40	Hard	---	---	Moderate	Low	Low.
Posen	>60	---	---	---	Moderate	Low	Moderate.
136A*:							
Westbury	>60	---	---	---	High	Moderate	High.
Gay	>60	---	---	---	High	High	Moderate.
137A*:							
Kinross	>60	---	---	---	Moderate	High	Moderate.
Wainola	>60	---	---	---	Moderate	Low	Moderate.
138B*:							
Rousseau	>60	---	---	---	Low	Low	Moderate.
Urban land.							
139A*:							
Rudyard	>60	---	---	---	Moderate	High	Low.
Urban land.							
143 Burleigh	>60	---	---	---	Moderate	High	Low.

See footnote at end of table.

TABLE 19.--SOIL FEATURES--Continued

Soil name and map symbol	Bedrock		Subsidence		Potential frost action	Risk of corrosion	
	Depth	Hardness	Initial	Total		Uncoated steel	Concrete
	In		In	In			
144*:							
Urban land.							
Udorthents.							
145A*:							
Gaastra	>60	---	---	---	High	Moderate	Moderate.
Gogomain	>60	---	---	---	High	High	Low.
Ingalls	>60	---	---	---	Moderate	Moderate	Moderate.
146A*:							
Allendale	>60	---	---	---	Moderate	High	Moderate.
Fibre	>60	---	---	5	Moderate	High	Moderate.
147B, 147D Shelter	>60	---	---	---	High	High	Low.
148B*:							
Longrie	20-40	Hard	---	---	Moderate	Low	Low.
Rock outcrop.							
149B Kalkaska	>60	---	---	---	Low	Low	High.
150 Fibre	>60	---	---	5	Moderate	High	Moderate.
151 Beavertail	>60	---	---	---	High	High	Low.
152 Grousehaven	>60	---	---	---	High	High	Low.
153*. Dumps							
154F*:							
Dawson	>60	---	---	30-36	High	High	High.
Deer Park	>60	---	---	---	Low	Low	Low.
Wainola	>60	---	---	---	Moderate	Low	Moderate.
156A*:							
Rockcut	>60	---	---	---	High	High	Low.
Pinconning	>60	---	---	---	Moderate	High	Moderate.
159B*, 159F*:							
Amasa	>60	---	---	---	Moderate	Low	Moderate.
Sugar	>60	---	---	---	High	High	Low.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 20.--WATER FEATURES

("Flooding" and "water table" and terms such as "occasional," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
10B, 10D Ontonagon	D	None	---	---	2.5-6.0	Perched	Mar-May
10F Ontonagon	D	None	---	---	>6.0	---	---
11A Rudyard	D	None	---	---	0.5-1.5	Perched	Nov-May
12 Pickford	D	None	---	---	+1-1.0	Perched	Nov-Jun
13B, 13D Alcona	B	None	---	---	2.5-6.0	Perched	Nov-May
13F Alcona	B	None	---	---	>6.0	---	---
14A Gaastra	C	None	---	---	1.0-2.0	Apparent	Nov-May
15B, 15D, 15E, 15F Rousseau	A	None	---	---	>6.0	---	---
17D, 17F Deer Park	A	None	---	---	>6.0	---	---
18B, 18D, 18E Rubicon	A	None	---	---	>6.0	---	---
19B, 19D, 19E, 19F Kalkaska	A	None	---	---	>6.0	---	---
20A Croswell	A	None	---	---	2.0-4.0	Apparent	Nov-May
21A Au Gres	B	None	---	---	0.5-1.5	Apparent	Nov-May
22 Kinross	A/D	None	---	---	+1-1.0	Apparent	Oct-Jun
23 Roscommon	A/D	None	---	---	+1-1.0	Apparent	Oct-Jun
25B, 25D Guardlake	A	None	---	---	>6.0	---	---
27B Emmet	B	None	---	---	>6.0	---	---
28B Longrie	B	None	---	---	>6.0	---	---
29A Solona	C	None	---	---	1.0-3.0	Apparent	Nov-May

TABLE 20.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
32A Allendale	B	None	---	---	1.0-2.0	Perched	Nov-May
33*. Pits							
34. Entisols							
35*:							
Histosols.							
Aquents.							
36*:							
Markey	A/D	None	---	---	+1-1.0	Apparent	Sep-Jun
Carbondale	A/D	None	---	---	+1-1.0	Apparent	Sep-Jun
37*:							
Dawson	A/D	None	---	---	+1-1.0	Apparent	Sep-Jun
Loxley	A/D	None	---	---	+1-1.0	Apparent	Sep-Jun
38F*:							
Deer Park	A	None	---	---	>6.0	---	---
Kinross	A/D	None	---	---	+1-1.0	Apparent	Oct-Jun
39D*:							
Au Gres	B	None	---	---	0.5-1.5	Apparent	Nov-May
Dawson	A/D	None	---	---	+1-1.0	Apparent	Sep-Jun
Rubicon	A	None	---	---	>6.0	---	---
40A*:							
Rudyard	D	None	---	---	0.5-1.5	Perched	Nov-May
Allendale	B	None	---	---	1.0-2.0	Perched	Nov-May
41D*, 41F*:							
Summerville	D	None	---	---	>6.0	---	---
Rock outcrop.							
42D*:							
Emmet	B	None	---	---	>6.0	---	---
Kalkaska	A	None	---	---	>6.0	---	---
44B, 44D, 44E Posen	B	None	---	---	>6.0	---	---
46B, 46D, 46E Pence	B	None	---	---	>6.0	---	---
48E*:							
Wainola	B	None	---	---	0.5-1.5	Apparent	Nov-May
Kinross	A/D	None	---	---	+1-1.0	Apparent	Oct-Jun

See footnote at end of table.

TABLE 20.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
48E*:							
Rousseau	A	None	---	---	>6.0	---	---
49A Wainola	B	None	---	---	0.5-1.5	Apparent	Nov-May
50 Deford	A/D	None	---	---	+1-1.0	Apparent	Oct-Jun
52A Ingalls	B	None	---	---	0.5-1.5	Apparent	Nov-May
53B Menominee	A	None	---	---	>6.0	---	---
56A Ensign	D	None	---	---	0.5-1.0	Apparent	Nov-May
57B*:							
Summerville	D	None	---	---	>6.0	---	---
Longrie	B	None	---	---	>6.0	---	---
61A Halfaday	A	None	---	---	2.0-3.5	Apparent	Nov-May
67B*:							
Duel	A	None	---	---	>6.0	---	---
Rock outcrop.							
68 Pinconning	B/D	None	---	---	+1-1.0	Apparent	Oct-Jun
78B Waiska	A	None	---	---	>6.0	---	---
79B*:							
Kalkaska	A	None	---	---	>6.0	---	---
Manistee	A	None	---	---	2.5-4.0	Perched	Nov-May
79D*:							
Kalkaska	A	None	---	---	>6.0	---	---
Manistee	A	None	---	---	>6.0	---	---
80B Superior	D	None	---	---	>6.0	---	---
83A*:							
Allendale	B	None	---	---	1.0-2.0	Perched	Nov-May
Croswell	A	None	---	---	2.0-4.0	Apparent	Nov-May
84B*, 84D*:							
Rousseau	A	None	---	---	>6.0	---	---
Alcona	B	None	---	---	2.5-6.0	Perched	Nov-May

See footnote at end of table.

TABLE 20.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
84F*:							
Rousseau	A	None	---	---	>6.0	---	---
Alcona	B	None	---	---	>6.0	---	---
85B*:							
Kalkaska	A	None	---	---	>6.0	---	---
Ocqueoc	B	None	---	---	2.5-6.0	Apparent	Nov-May
86A*:							
Ingalls	B	None	---	---	0.5-1.5	Apparent	Nov-May
Halfaday	A	None	---	---	2.0-3.5	Apparent	Nov-Apr
87B Rousseau	A	None	---	---	2.5-6.0	Apparent	Nov-May
88A*:							
Croswell	A	None	---	---	2.0-4.0	Apparent	Nov-May
Au Gres	B	None	---	---	0.5-1.5	Apparent	Nov-May
89A*:							
Kinross	A/D	None	---	---	+1-1.0	Apparent	Oct-Jun
Au Gres	B	None	---	---	0.5-1.5	Apparent	Nov-May
91B, 91D, 91E Rousseau	A	None	---	---	>6.0	---	---
92A Biscuit	B/D	None	---	---	0.5-1.5	Perched	Nov-May
93F*:							
Ontonagon	D	None	---	---	>6.0	---	---
Pickford	D	Occasional	Brief	Oct-Apr	+1-1.0	Perched	Nov-Jun
94A*:							
Markey	A/D	None	---	---	+1-1.0	Apparent	Sep-Jun
Kinross	A/D	None	---	---	+1-1.0	Apparent	Sep-Jun
Au Gres	B	None	---	---	0.5-1.5	Apparent	Nov-May
95A Bowers	C	None	---	---	1.0-2.0	Perched	Nov-Apr
96B*:							
Velvet	C	None	---	---	1.0-2.0	Perched	Nov-May
Westbury	C	None	---	---	0.5-1.5	Perched	Nov-May
97A Wega	B	None	---	---	1.0-3.0	Perched	Oct-May
98 Ermatinger	B/D	None	---	---	+1-1.0	Apparent	Oct-Jun

See footnote at end of table.

TABLE 20.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
99A Westbury	C	None	---	---	0.5-1.5	Perched	Nov-May
101 Chippeny	D	None	---	---	+1-1.0	Apparent	Sep-May
102*:							
Kinross	A/D	None	---	---	+1-1.0	Apparent	Oct-Jun
Dawson	A/D	None	---	---	+1-1.0	Apparent	Sep-Jun
103D*:							
Velvet	C	None	---	---	1.0-2.0	Perched	Nov-May
Rockbottom	B	None	---	---	1.5-2.5	Perched	Nov-May
103E*:							
Velvet	C	None	---	---	>6.0	---	---
Rockbottom	B	None	---	---	>6.0	---	---
104B, 104D, 104F Amasa	B	None	---	---	>6.0	---	---
106A*:							
Potagannissing	D	None	---	---	0-0.5	Perched	Nov-May
Rock outcrop.							
107B Oldman	C	None	---	---	1.0-2.0	Perched	Nov-May
108D*:							
Shelter	D	None	---	---	0.5-1.0	Perched	Oct-May
Alpena	A	None	---	---	>6.0	---	---
111 Gutport	D	None	---	---	+1-1.0	Apparent	Oct-Jul
112 Soo	C/D	None	---	---	+1-1.0	Perched	Oct-Jun
113 Ruse	D	None	---	---	+1-1.0	Apparent	Nov-Jun
114B, 114D Velvet	C	None	---	---	1.0-2.0	Perched	Nov-May
116*. Udorthents							
117B Manistee	A	None	---	---	2.5-4.0	Perched	Nov-May
117D, 117F Manistee	A	None	---	---	>6.0	---	---
119 Gogomain	B/D	None	---	---	+1-1.0	Perched	Nov-Jun

See footnote at end of table.

TABLE 20.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
121B Rockbottom	B	None	---	---	1.5-2.5	Perched	Nov-May
122*. Pits							
123B Ocqueoc	B	None	---	---	2.5-6.0	Apparent	Nov-May
124D Alpena	A	None	---	---	>6.0	---	---
125B*:							
Croswell	A	None	---	---	2.0-4.0	Apparent	Nov-May
Markey	A/D	None	---	---	+1-1.0	Apparent	Sep-Jun
126 Pickford	D	None	---	---	+1-1.0	Perched	Nov-Jun
127 Gay	D	None	---	---	+1-0.5	Apparent	Nov-Jun
128F*:							
Alcona	B	None	---	---	>6.0	---	---
Markey	A/D	None	---	---	+1-1.0	Apparent	Sep-Jun
129A Rudyard	D	None	---	---	0.5-1.5	Perched	Nov-May
130A*:							
Rudyard	D	None	---	---	0.5-1.5	Perched	Nov-May
Pickford	D	None	---	---	+1-1.0	Perched	Nov-Jun
132B Sugar	B	None	---	---	1.0-4.0	Perched	Nov-May
132F Sugar	B	None	---	---	>6.0	---	---
133 Dora	B/D	None	---	---	+2-1.0	Apparent	Sep-Jun
135B*:							
Longrie	B	None	---	---	>6.0	---	---
Posen	B	None	---	---	>6.0	---	---
136A*:							
Westbury	C	None	---	---	0.5-1.5	Perched	Nov-May
Gay	D	None	---	---	+1-0.5	Apparent	Nov-Jun
137A*:							
Kinross	A/D	None	---	---	+1-1.0	Apparent	Oct-Jun
Wainola	B	None	---	---	0.5-1.5	Apparent	Nov-May

See footnote at end of table.

TABLE 20.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
138B*:							
Rousseau	A	None	---	---	>6.0	---	---
Urban land.							
139A*:							
Rudyard	D	None	---	---	0.5-1.5	Perched	Nov-May
Urban land.							
143 Burleigh	A/D	None	---	---	+1-1.0	Apparent	Oct-Jun
144*:							
Urban land.							
Udorthents.							
145A*:							
Gaastra	C	None	---	---	1.0-2.0	Apparent	Nov-May
Gogomain	B/D	None	---	---	+1-1.0	Apparent	Nov-Jun
Ingalls	B	None	---	---	0.5-1.5	Apparent	Nov-May
146A*:							
Allendale	B	None	---	---	1.0-2.0	Perched	Nov-May
Fibre	B/D	None	---	---	+1-1.0	Perched	Oct-Jun
147B, 147D Shelter	B	None	---	---	0.5-1.0	Perched	Oct-May
148B*:							
Longrie	B	None	---	---	>6.0	---	---
Rock outcrop.							
149B Kalkaska	A	None	---	---	>6.0	---	---
150 Fibre	B/D	None	---	---	+1-1.0	Perched	Oct-Jun
151 Beavertail	D	None	---	---	+1-1.0	Apparent	Oct-Jun
152 Grousehaven	D	None	---	---	+1-1.0	Apparent	Jan-Dec
153*. Dumps							
154F*:							
Dawson	A/D	None	---	---	+1-1.0	Apparent	Sep-Jun
Deer Park	A	None	---	---	>6.0	---	---
Wainola	B	None	---	---	0.5-1.5	Apparent	Nov-May

See footnote at end of table.

TABLE 20.--WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table		
		Frequency	Duration	Months	Depth	Kind	Months
					Ft		
155B*:							
Allendale	B	None	---	---	1.0-2.0	Perched	Nov-May
Posen	B	None	---	---	>6.0	---	---
Pickford	D	None	---	---	+1-1.0	Perched	Nov-Jun
156A*:							
Rockcut	B	None	---	---	0.5-1.5	Apparent	Nov-May
Pinconning	B/D	None	---	---	+1-1.0	Apparent	Oct-May
159B*:							
Amasa	B	None	---	---	>6.0	---	---
Sugar	B	None	---	---	1.0-4.0	Perched	Nov-May
159F*:							
Amasa	B	None	---	---	>6.0	---	---
Sugar	B	None	---	---	>6.0	---	---

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 21.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
*Alcona	Coarse-loamy, mixed, frigid Alfic Haplorthods
Allendale	Sandy over clayey, mixed, frigid Alfic Haplaquods
*Alpena	Sandy-skeletal, mixed Udorthentic Haploborolls
*Amasa	Coarse-loamy over sandy or sandy-skeletal, mixed, frigid Typic Haplorthods
Aquents	Mixed, nonacid, frigid Aquents
Au Gres	Sandy, mixed, frigid Entic Haplaquods
Beavertail	Loamy-skeletal, carbonatic, frigid Histic Humaquepts
Biscuit	Coarse-silty over clayey, mixed, frigid Alfic Haplaquods
Bowers	Fine, mixed Aquic Eutroboralfs
*Burleigh	Sandy over loamy, mixed, nonacid, frigid Mollic Haplaquents
Carbondale	Euic Hemic Borosaprists
Chippeny	Euic Lithic Borosaprists
Croswell	Sandy, mixed, frigid Entic Haplorthods
Dawson	Sandy or sandy-skeletal, mixed, dysic Terric Borosaprists
Deer Park	Mixed, frigid Spodic Udipsamments
Deford	Mixed, frigid Typic Psammaquents
Dora	Clayey, montmorillonitic, euic Terric Borosaprists
Duel	Sandy, mixed, frigid Entic Haplorthods
*Emmet	Coarse-loamy, mixed Typic Eutroboralfs
*Ensign	Loamy, mixed, nonacid, frigid Lithic Haplaquepts
Entisols	Mixed, nonacid, frigid Entisols
Ermatinger	Coarse-silty, mixed, nonacid, frigid Aeric Fluvaquents
Fibre	Sandy over clayey, mixed, frigid Alfic Haplaquods
Gaastra	Coarse-loamy, mixed, frigid Alfic Haplaquods
Gay	Coarse-loamy, mixed, nonacid, frigid Typic Haplaquepts
Gogomain	Coarse-loamy over clayey, mixed, nonacid, frigid Aeric Haplaquepts
Grousehaven	Fine-silty, carbonatic, frigid Histic Humaquepts
*Guardlake	Sandy-skeletal, mixed, frigid Typic Haplorthods
Gutport	Fine, mixed, nonacid, frigid Histic Humaquepts
Halfaday	Sandy, mixed, frigid Typic Haplorthods
Histosols	Euic, frigid Histosols
Ingalls	Sandy over loamy, mixed, frigid Entic Haplaquods
*Kalkaska	Sandy, mixed, frigid Typic Haplorthods
Kinross	Sandy, mixed, frigid Typic Haplaquods
Longrie	Coarse-loamy, mixed, frigid Entic Haplorthods
Loxley	Dysic Typic Borosaprists
Manistee	Sandy over clayey, mixed, frigid Alfic Haplorthods
Markey	Sandy or sandy-skeletal, mixed, euic Terric Borosaprists
Menominee	Sandy over loamy, mixed, frigid Alfic Haplorthods
Ocqueoc	Sandy over loamy, mixed, frigid Entic Haplorthods
Oldman	Loamy-skeletal, mixed, frigid Alfic Fragiorthods
Ontonagon	Very fine, mixed Glossic Eutroboralfs
Pence	Sandy, mixed, frigid Entic Haplorthods
Pickford	Fine, mixed, nonacid, frigid Typic Haplaquepts
*Pinconning	Sandy over clayey, mixed, nonacid, frigid Mollic Haplaquents
Posen	Loamy-skeletal, mixed, frigid Typic Eutrochrepts
Potagannissing	Loamy, mixed Lithic Haploborolls
Rockbottom	Loamy-skeletal, mixed Typic Eutroboralfs
Rockcut	Sandy-skeletal over loamy, mixed, nonacid, frigid Aeric Fluvaquents
*Roscommon	Mixed, frigid Mollic Psammaquents
Rousseau	Sandy, mixed, frigid Entic Haplorthods
Rubicon	Sandy, mixed, frigid Entic Haplorthods
Rudyard	Very fine, illitic Aquic Eutroboralfs
*Ruse	Loamy, mixed, nonacid, frigid Lithic Haplaquepts
Shelter	Loamy-skeletal, carbonatic, frigid Eutrochreptic Rendolls
*Solona	Coarse-loamy, mixed Aquic Eutroboralfs
Soo	Fine-silty, mixed, nonacid, frigid Typic Haplaquepts
Sugar	Coarse-silty over clayey, mixed, frigid Alfic Haplorthods
Summerville	Loamy, mixed, frigid Lithic Eutrochrepts
Superior	Coarse-loamy over clayey, mixed, frigid Alfic Haplorthods
Udorthents	Loamy, mixed, nonacid, frigid Udorthents

TABLE 21.--CLASSIFICATION OF THE SOILS--Continued

Soil name	Family or higher taxonomic class
Velvet	Sandy-skeletal, mixed, frigid Entic Fragiorthods
Wainola	Sandy, mixed, frigid Entic Haplaquods
*Waiska	Sandy-skeletal, mixed, frigid Typic Haplorthods
Wega	Coarse-silty, mixed, nonacid, frigid Aquic Udifluvents
Westbury	Coarse-loamy, mixed, frigid Typic Fragiaquods

Interpretive Groups

INTERPRETIVE GROUPS

(Dashes indicate that the soil was not assigned to the interpretive group)

Soil name and map symbol	Land capability	Prime farmland	Habitat type		Woodland ordination symbol	Michigan soil management group
			Primary	Secondary		
10B---------------------- Ontonagon	IIIe	---	TAM	ATD	2C	0a
10D---------------------- Ontonagon	IIIe	---	TAM	ATD	2C	0a
10F---------------------- Ontonagon	VIIe	---	TAM	ATD	2R	0a
11A---------------------- Rudyard	IIIw	---	TTP	---	6W	0b
12----------------------- Pickford	IIIw	---	TTP	FE	6W	1c
13B---------------------- Alcona	IIe	Yes	ATD	AVO	3L	3a-s
13D---------------------- Alcona	IIIe	---	ATD	AVO	3L	3a-s
13F---------------------- Alcona	VIIe	---	ATD	AVO	3R	3a-s
14A---------------------- Gaastra	IIw	Yes*	TMC-D	---	3W	2.5b
15B---------------------- Rousseau	IIIs	---	ATD	TM	3S	5a
15D---------------------- Rousseau	IIIe	---	ATD	TM	3S	5a
15E---------------------- Rousseau	VIe	---	ATD	TM	3R	5a
15F---------------------- Rousseau	VIe	---	ATD	TM	3R	5a
17D---------------------- Deer Park	VIIs	---	PVC	QAE	4S	5.3a
17F---------------------- Deer Park	VIIs	---	PVC	QAE	4R	5.3a
18B---------------------- Rubicon	VIs	---	QAE	TMV	4S	5.3a
18D---------------------- Rubicon	VIs	---	QAE	TMV	4S	5.3a
18E---------------------- Rubicon	VIIs	---	QAE	TMV	4R	5.3a
19B---------------------- Kalkaska	IVs	---	ATD	TM	3S	5a
19D---------------------- Kalkaska	VIs	---	ATD	TM	3S	5a

See footnote at end of table.

INTERPRETIVE GROUPS--Continued

Soil name and map symbol	Land capability	Prime farmland	Habitat type		Woodland ordination symbol	Michigan soil management group
			Primary	Secondary		
19E---------------------- Kalkaska	VIIs	---	ATD	TM	3R	5a
19F---------------------- Kalkaska	VIIs	---	ATD	TM	3R	5a
20A---------------------- Croswell	IVs	---	TM	---	5S	5a
21A---------------------- Au Gres	IVw	---	TMC	---	6W	5b
22----------------------- Kinross	VIw	---	TTS	TMC	2W	5c
23----------------------- Roscommon	VIw	---	---	---	6W	5c
25B---------------------- Guardlake	IIIs	---	AVO	---	3A	Ga
25D---------------------- Guardlake	IIIs	---	AVO	---	3A	Ga
27B---------------------- Emmet	IIe	Yes	AVO-A	---	3L	3a
28B---------------------- Longrie	IIe	---	AVO	---	2D	3/Ra
29A---------------------- Solona	IIw	Yes*	---	---	3W	3b
32A---------------------- Allendale	IIIw	---	TMC-D	TMC	4W	4/1b
33. Pits						
34. Entisols						
35. Histosols and Aquents						
36-----------------------	VIw	---	TTS	---		
Markey------------------					2W	M/4c
Carbondale--------------					5W	Mc
37----------------------- Dawson and Loxley	VIIw	---	PCS	---	2W	Mc-a
38F----------------------	VIIs	---	PVC	TTS		
Deer Park---------------					4R	5.3a
Kinross-----------------					2W	5c
39D----------------------	IVw	---	TMC	PCS		
Au Gres-----------------					6W	5b
Dawson------------------					2W	Mc-a
Rubicon-----------------					4S	5.3a

See footnote at end of table.

INTERPRETIVE GROUPS--Continued

Soil name and map symbol	Land capability	Prime farmland	Habitat type		Woodland ordination symbol	Michigan soil management group
			Primary	Secondary		
40A	IIIw	---	TTP	TMC-D		
Rudyard					6W	0b
Allendale					4W	4/1b
41D	IVe	---	TM	ATD		
Summerville					2D	Ra
Rock outcrop.						
41F	VIIe	---	TM	ATD		
Summerville					2R	Ra
Rock outcrop.						
42D	IIIe	---	AVO-A	ATD		
Emmet					3L	3a
Kalkaska					3S	5a
44B Posen	IIIs	---	AVO	---	2X	3a
44D Posen	VIs	---	AVO	---	2X	3a
44E Posen	VIIs	---	AVO	---	2R	3a
46B Pence	IIIe	---	ATD	---	3S	5a
46D Pence	IVe	---	ATD	---	3S	5a
46E Pence	VIIe	---	ATD	---	3R	5a
48E	IIIw	---	TMC	TTS		
Wainola					6W	5b
Kinross					2W	5c
Rousseau					5R	4a
49A Wainola	IIIw	---	TMC	TMC-V	6W	5b
50 Deford	Vw	---	---	---	4W	5c
52A Ingalls	IIIw	Yes*	---	---	4W	4/2b
53B Menominee	IIIs	---	---	---	6A	4/2a
56A Ensign	VIIw	---	---	---	2W	Rbc
57B	IIIs	---	---	---		
Summerville					2D	Ra
Longrie					2D	3/Ra
61A Halfaday	IIIs	---	ATD	TMC-D	3S	5a

See footnote at end of table.

INTERPRETIVE GROUPS--Continued

Soil name and map symbol	Land capability	Prime farmland	Habitat type		Woodland ordination symbol	Michigan soil management group
			Primary	Secondary		
67B	IVs	---	TM	---		
Duel					2D	4/Ra
Rock outcrop.						
68	Vw	---	---	---	3W	4/1c
Pinconning						
78B	VIs	---	---	---	3A	5a
Waiska						
79B	IVs	---	ATD	---		
Kalkaska					3S	5a
Manistee					3S	4/1a
79D	VIs	---	ATD			
Kalkaska					3S	5a
Manistee					3S	4/1a
80B	IIe	---	---	---	6D	1a
Superior						
83A	IIIw	---	TMC-D	TM		
Allendale					4W	4/1b
Croswell					5S	5.3a
84B	IIIs	---	ATD	---		
Rousseau					3S	5a
Alcona					3L	3a-s
84D	IIIe	---	ATD	---		
Rousseau					3S	5a
Alcona					3L	3a-s
84F	VIe	---	ATD	---		
Rousseau					3R	5a
Alcona					3R	3a-s
85B	IVs	---	ATD	---		
Kalkaska					3S	5a
Ocqueoc					3S	4/2a
86A	IIIw	---	---	---		
Ingalls					4W	4/2b
Halfaday					3S	5a
87B	IIIs	---	---	---	5S	4a
Rousseau						
88A	IVs	---	TM	TMC		
Croswell					5S	5a
Au Gres					6W	5b
89A	VIw	---	TTS	TMC		
Kinross					2W	5c
Au Gres					6W	5b
91B	IIIs	---	TM	TMV	5S	4a
Rousseau						
91D	IIIe	---	TM	TMV	5S	4a
Rousseau						

See footnote at end of table.

INTERPRETIVE GROUPS--Continued

Soil name and map symbol	Land capability	Prime farmland	Habitat type		Woodland ordination symbol	Michigan soil management group
			Primary	Secondary		
91E Rousseau	VIIe	---	TM	TMV	5R	4a
92A Biscuit	IIIw	---	TMC	TMC-D	2W	3/1b
93F	VIIe	---	TAM	TTP		
Ontonagon					2R	0a
Pickford					6W	1c
94A	VIw	---	TTS	TMC		
Markey					7W	M/4c
Kinross					2W	5c
Au Gres					6W	5b
95A Bowers	IIw	Yes*	TTP	---	7W	1.5b
96B	VIs	---	TM	---		
Velvet					3X	Ga
Westbury					3W	Gbc
97A Wega	IIw	Yes*	---	---	3W	2.5b
98 Ermatinger	Vw	Yes*	TAM-Eq	---	2W	2.5c
99A Westbury	VIIs	---	---	---	3W	Gbc
101 Chippeny	VIIw	---	---	---	4W	M/Rc
102	VIw	---	TTS	PCS		
Kinross					2W	5c
Dawson					2W	Mc-a
103D	VIs	---	TM	---		
Velvet					3X	Ga
Rockbottom					3X	2.5a
103E	VIs	---	TM	---		
Velvet					3R	Ga
Rockbottom					3R	2.5a
104B Amasa	IIe	Yes	ATD	AVO	3L	3/5a
104D Amasa	IIIe	---	ATD	AVO	3L	3/5a
104F Amasa	VIIe	---	ATD	AVO	3R	3/5a
106A	VIIs	---	---	---		
Potagannissing					3W	Rbc
Rock outcrop.						
107B Oldman	VIs	---	AVO	ATD	3X	Ga

See footnote at end of table.

INTERPRETIVE GROUPS--Continued

Soil name and map symbol	Land capability	Prime farmland	Habitat type		Woodland ordination symbol	Michigan soil management group
			Primary	Secondary		
108D	VIw	---	---	---		
Shelter					4X	Gbc
Alpena					3F	Ga
111	VIIw	---	---	---	3W	M/Rc
Gutport						
112	IIw	Yes*	TTP	---	6W	1.5c
Soo						
113	VIIw	---	---	---	5W	Rbc
Ruse						
114B	VIs	---	TM	ATD	3X	Ga
Velvet						
114D	VIs	---	TM	ATD	3X	Ga
Velvet						
116.						
Udorthents						
117B	IIIs	---	---	---	3S	4/1a
Manistee						
117D	IIIe	---	---	---	3S	4/1a
Manistee						
117F	VIIe	---	---	---	3R	4/1a
Manistee						
119	Vw	Yes*	---	---	4W	3/1c
Gogomain						
121B	VIs	---	---	---	3X	2.5a
Rockbottom						
122.						
Pits						
123B	IIIs	---	---	---	3S	4/2a
Ocqueoc						
124D	VIs	---	---	---	3F	Ga
Alpena						
125B	IVs	---	TM	TTS		
Croswell					5S	5a
Markey					2W	M/4c
126	IIIw	---	TTP	FE	6W	1c
Pickford						
127	Vw	---	---	---	3W	3c
Gay						
128F	VIIe	---	AVO	TTS		
Alcona					3R	3a-s
Markey					2W	M/4c

See footnote at end of table.

INTERPRETIVE GROUPS--Continued

Soil name and map symbol	Land capability	Prime farmland	Habitat type		Woodland ordination symbol	Michigan soil management group
			Primary	Secondary		
129A Rudyard	IIIw	---	TTP	---	6W	0b
130A	IIIw	---	TTP	---		
Rudyard					6W	0b
Pickford					6W	1c
132B Sugar	IIe	Yes	ATD	AVO	3L	3/1a
132F Sugar	VIIe	---	ATD	AVO	3R	3/1a
133 Dora	VIw	---	---	---	3W	M/1c
135B	IIe	---	AVO	---		
Longrie					2D	3/Ra
Posen					2X	3a
136A	VIIs	---	---	---		
Westbury					3W	Gbc
Gay					6W	3c
137A	VIw	---	TTS	TMC		
Kinross					2W	5c
Wainola					6W	5b
138B. Rousseau-Urban land						
139A. Rudyard-Urban land						
143 Burleigh	Vw	---	---	---	2W	4/2c
144. Urban land-Udorthents						
145A	IIw	Yes*	TMC-D	---		
Gaastra					3W	2.5b
Gogomain					4W	3/1c
Ingalls					4W	4/2b
146A	IIIw	---	TMC-D	---		
Allendale					4W	4/1b
Fibre					3W	4/1c
147B Shelter	VIw	---	---	---	4X	Gbc
147D Shelter	VIw	---	---	---	4X	Gbc
148B	IIe	---	AVO	---		
Longrie					3D	3/Ra
Rock outcrop.						
149B Kalkaska	VIs	---	ATD	TM	3S	5a

See footnote at end of table.

INTERPRETIVE GROUPS--Continued

Soil name and map symbol	Land capability	Prime farmland	Habitat type		Woodland ordination symbol	Michigan soil management group
			Primary	Secondary		
150---------------------- Fibre	Vw	---	TMC-D	---	3W	4/1c
151---------------------- Beavertail	Vw	---	---	---	3W	Gbc
152---------------------- Grousehaven	VIIw	---	---	---	---	M/Mc
153. Dumps						
154F---------------------	VIIw	---	PCS	PVC		
Dawson-------------------					2W	Mc-a
Deer Park----------------					4R	5.3a
Wainola------------------					6W	5b
155B---------------------	IIIW	---	TMC-D	AVO		
Allendale----------------					4W	4/1b
Posen--------------------					2X	3a
Pickford-----------------					6W	1c
156A---------------------	VIs	---	---	---		
Rockcut------------------					3W	Gbc
Pinconning---------------					3W	4/1c
159B---------------------	IIe	---	ATD	---		
Amasa--------------------					3L	3/5a
Sugar--------------------					3L	3/1a
159F---------------------	VIIe	---	ATD	---		
Amasa--------------------					3R	3/5a
Sugar--------------------					3R	3/1a

* Where drained.

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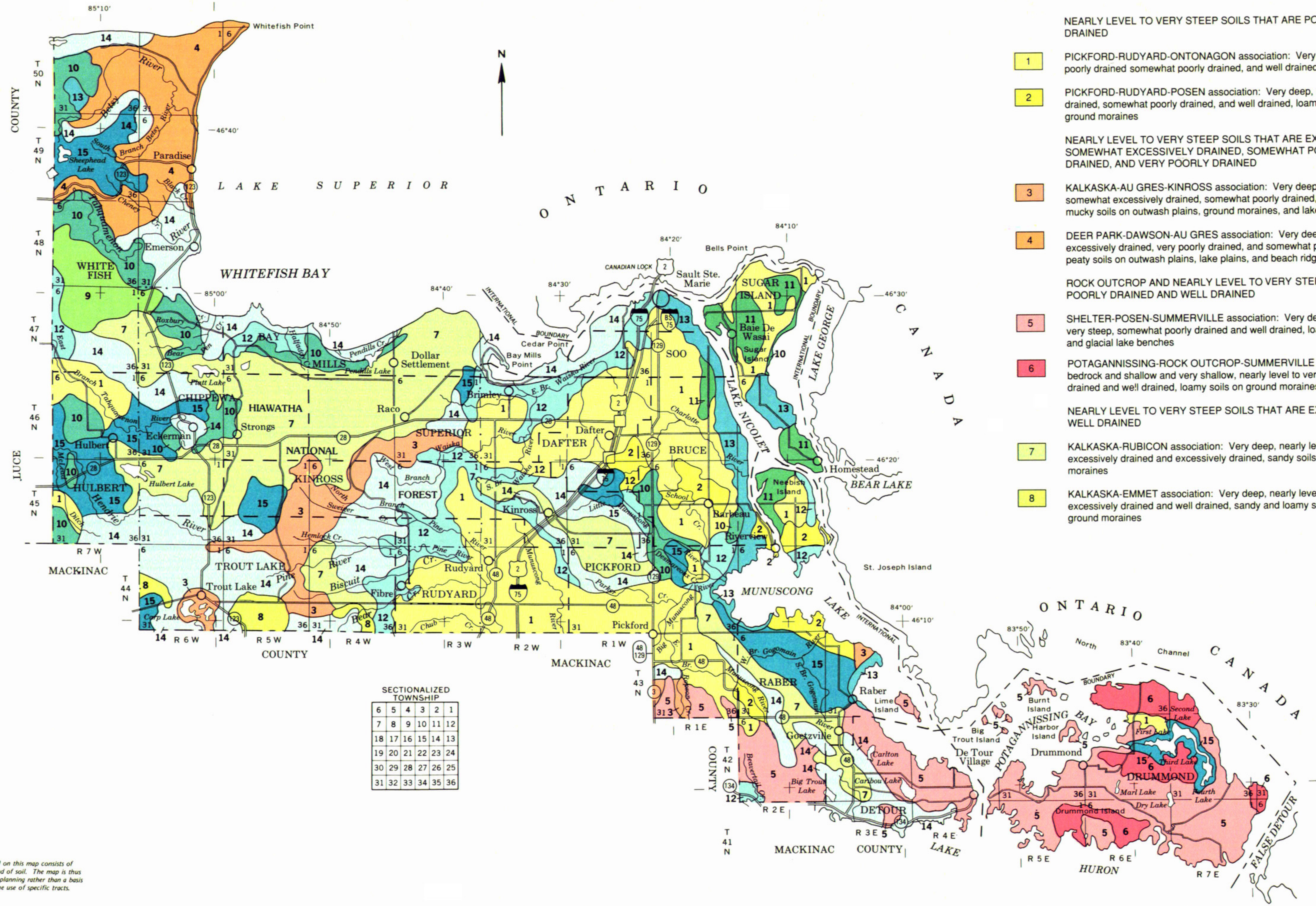

N
Whitefish Point
Paradise
Emerson
WHITE FISH
WHITEFISH BAY
LAKE SUPERIOR
ONTARIO
CANADA
BAY MILLS
Dollar Settlement
Bay Mills Point
Cedar Point
Brimley
Raco
HIAWATHA
Strongs
CHIPPEWA
Eckerman
Hulbert
HULBERT
SUPERIOR
NATIONAL
KINROSS
FOREST
Kinross
DAFTER
Dafter
BRUCE
SOO
Sault Ste. Marie
SUGAR ISLAND
Baie De Wasai
LAKE NICOLET
LAKE GEORGE
Homestead
BEAR LAKE
Neebish Island
Barbeau
Rivers
PICKFORD
Pickford
RUDYARD
Rudyard
TROUT LAKE
Trout Lake
MUNUSCONG
St. Joseph Island
RABER
Raber
Goetzville
DETOUR
De Tour Village
Drummond
DRUMMOND
POTAGANNISSING BAY
HURON
FALSE DETOUR
LUCE COUNTY
MACKINAC COUNTY
R 7 W
R 6 W
R 5 W
R 4 W
R 3 W
R 2 W
R 1 W
R 1 E
R 2 E
R 3 E
R 4 E
R 5 E
R 6 E
R 7 E
T 50 N
T 49 N
T 48 N
T 47 N
T 46 N
T 45 N
T 44 N
T 43 N
T 42 N
T 41 N

SECTIONALIZED TOWNSHIP

6	5	4	3	2	1
7	8	9	10	11	12
18	17	16	15	14	13
19	20	21	22	23	24
30	29	28	27	26	25
31	32	33	34	35	36

Each area outlined on this map consists of more than one kind of soil. The map is thus meant for general planning rather than a basis for decisions on the use of specific tracts.

SOIL LEGEND*

NEARLY LEVEL TO VERY STEEP SOILS THAT ARE POORLY DRAINED TO WELL DRAINED

1 PICKFORD-RUDYARD-ONTONAGON association: Very deep, nearly level to very steep, poorly drained somewhat poorly drained, and well drained, loamy soils on lake plains

2 PICKFORD-RUDYARD-POSEN association: Very deep, nearly level to rolling, poorly drained, somewhat poorly drained, and well drained, loamy soils on lake plains and ground moraines

NEARLY LEVEL TO VERY STEEP SOILS THAT ARE EXCESSIVELY DRAINED, SOMEWHAT EXCESSIVELY DRAINED, SOMEWHAT POORLY DRAINED, POORLY DRAINED, AND VERY POORLY DRAINED

3 KALKASKA-AU GRES-KINROSS association: Very deep, nearly level to very steep, somewhat excessively drained, somewhat poorly drained, and poorly drained, sandy and mucky soils on outwash plains, ground moraines, and lake plains

4 DEER PARK-DAWSON-AU GRES association: Very deep, nearly level to rolling, excessively drained, very poorly drained, and somewhat poorly drained, sandy and peaty soils on outwash plains, lake plains, and beach ridges

ROCK OUTCROP AND NEARLY LEVEL TO VERY STEEP SOILS THAT ARE SOMEWHAT POORLY DRAINED AND WELL DRAINED

5 SHELTER-POSEN-SUMMERVILLE association: Very deep and shallow, nearly level to very steep, somewhat poorly drained and well drained, loamy soils on ground moraines and glacial lake benches

6 POTAGANNISSING-ROCK OUTCROP-SUMMERVILLE association: Exposed limestone bedrock and shallow and very shallow, nearly level to very steep, somewhat poorly drained and well drained, loamy soils on ground moraines and glacial lake benches

NEARLY LEVEL TO VERY STEEP SOILS THAT ARE EXCESSIVELY DRAINED TO WELL DRAINED

7 KALKASKA-RUBICON association: Very deep, nearly level to very steep, somewhat excessively drained and excessively drained, sandy soils on outwash plains and ground moraines

8 KALKASKA-EMMET association: Very deep, nearly level to very steep, somewhat excessively drained and well drained, sandy and loamy soils on outwash plains and ground moraines

9 PENCE-KALKASKA association: Very deep, nearly level to very steep, well drained and somewhat excessively drained, sandy soils on outwash plains

NEARLY LEVEL TO VERY STEEP SOILS THAT ARE WELL DRAINED TO POORLY DRAINED

10 ALCONA-INGALLS-MANISTEE association: Very deep, nearly level to very steep, well drained, moderately well drained, and somewhat poorly drained, sandy soils on outwash plains, lake plains, and ground moraines

11 OLDMAN-VELVET-GAY association: Very deep, nearly level to steep, moderately well drained, well drained, and poorly drained, loamy, sandy, and mucky soils on ground moraines and end moraines

NEARLY LEVEL TO UNDULATING SOILS THAT ARE VERY POORLY DRAINED TO MODERATELY WELL DRAINED

12 FIBRE-ALLENDALE-PICKFORD association: Very deep, nearly level, poorly drained and somewhat poorly drained, mucky, sandy, and loamy soils on lake plains, ground moraines, and outwash plains

13 ERMATINGER-WEGA-BURLEIGH association: Very deep, nearly level, poorly drained and somewhat poorly drained, loamy and sandy soils on lake plains and the former flood plains of glacial rivers

14 MARKEY-KINROSS-CROSWELL association: Very deep, nearly level to undulating, very poorly drained, poorly drained, and moderately well drained, mucky and sandy soils on outwash plains

15 MARKEY-DAWSON association: Very deep, nearly level, very poorly drained, mucky and peaty soils on outwash plains, lake plains, and ground moraines

*Texture terms in the descriptive headings refer to the surface layer of the major soils in the associations.

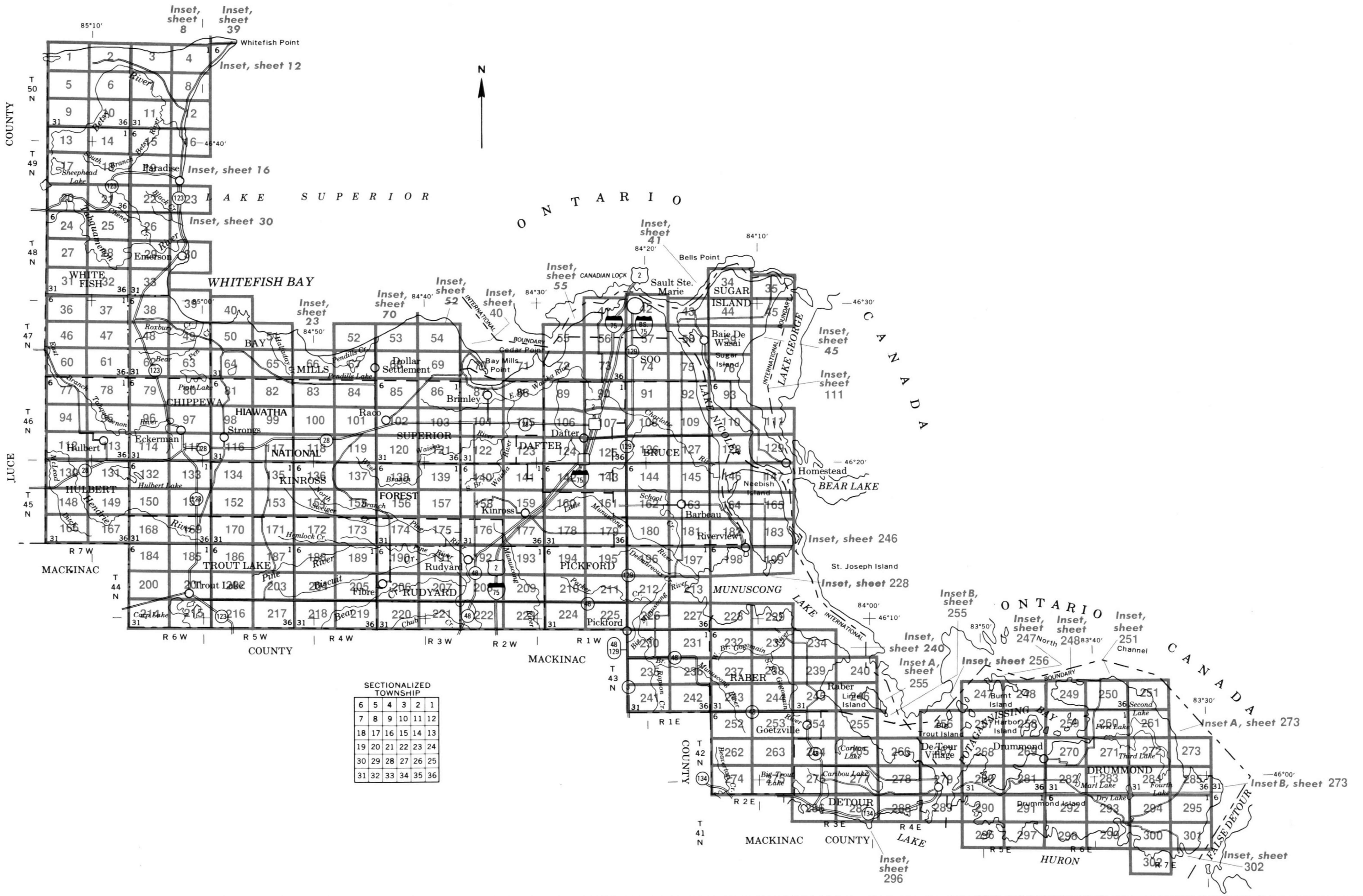
Compiled 1990

UNITED STATES DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
FOREST SERVICE
MICHIGAN DEPARTMENT OF AGRICULTURE
MICHIGAN AGRICULTURAL EXPERIMENT STATION
MICHIGAN TECHNOLOGICAL UNIVERSITY

GENERAL SOIL MAP

CHIPPEWA COUNTY, MICHIGAN

Scale 1:380,160
1 0 1 2 3 4 5 6 Miles
1 0 5 10 Km


Inset, sheet 8
Inset, sheet 39
Whitefish Point
Inset, sheet 12
Inset, sheet 16
Inset, sheet 30
Paradise
Emerson
LAKE SUPERIOR
WHITEFISH BAY
WHITEFISH
LUCE COUNTY
T 50 N
T 49 N
T 48 N
T 47 N
T 46 N
T 45 N
T 44 N
T 43 N
T 42 N
T 41 N
R 7 W
R 6 W
R 5 W
R 4 W
R 3 W
R 2 W
R 1 W
R 1 E
R 2 E
R 3 E
R 4 E
R 5 E
R 6 E
R 7 E
MACKINAC COUNTY
ONTARIO
CANADA
Inset, sheet 23
Inset, sheet 70
Inset, sheet 52
Inset, sheet 40
Inset, sheet 55
Inset, sheet 41
Bells Point
Sault Ste. Marie
CANADIAN LOCK
SUGAR ISLAND
Baie De Wasai
Sugar Island
LAKE GEORGE
Inset, sheet 45
Inset, sheet 111
BAY MILLS
Dollar Settlement
Bay Mills Point
Cedar Point
Brimley
SOO
CHIPPEWA
HIAWATHA
Eckerman
Strongs
Raco
SUPERIOR
DAFTER
Dafter
BRUCE
Hulbert
HULBERT
NATIONAL
KINROSS
FOREST
Kinross
Homestead
BEAR LAKE
Neebish Island
Barbeau
Riverview
Inset, sheet 246
St. Joseph Island
Inset, sheet 228
TROUT LAKE
Trout Lake
Rudyard
RUDYARD
Fibre
PICKFORD
Pickford
MUNUSCONG
LAKE
INTERNATIONAL BOUNDARY
RABER
Raber
Lime Island
Goetzville
DETOUR
De Tour Village
Inset B, sheet 255
Inset, sheet 240
Inset A, sheet 255
Inset, sheet 247
Inset, sheet 248
Inset, sheet 251
Inset, sheet 256
North Channel
Burnt Island
Harbor Island
Trout Island
POTAGANNISSING BAY
Drummond
DRUMMOND
Drummond Island
Inset A, sheet 273
Inset B, sheet 273
FALSE DETOUR
Inset, sheet 302
Inset, sheet 296
LAKE HURON
SECTIONALIZED TOWNSHIP
85°10'
85°00'
84°50'
84°40'
84°30'
84°20'
84°10'
84°00'
83°50'
83°40'
83°30'
46°40'
46°30'
46°20'
46°10'
46°00'
N

INDEX TO MAP SHEETS

CHIPPEWA COUNTY, MICHIGAN

Scale 1:380,160

1 0 1 2 3 4 5 6 Miles

1 0 5 10 Km

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE AND FOREST SERVICE

CHIPPEWA COUNTY, MICHIGAN

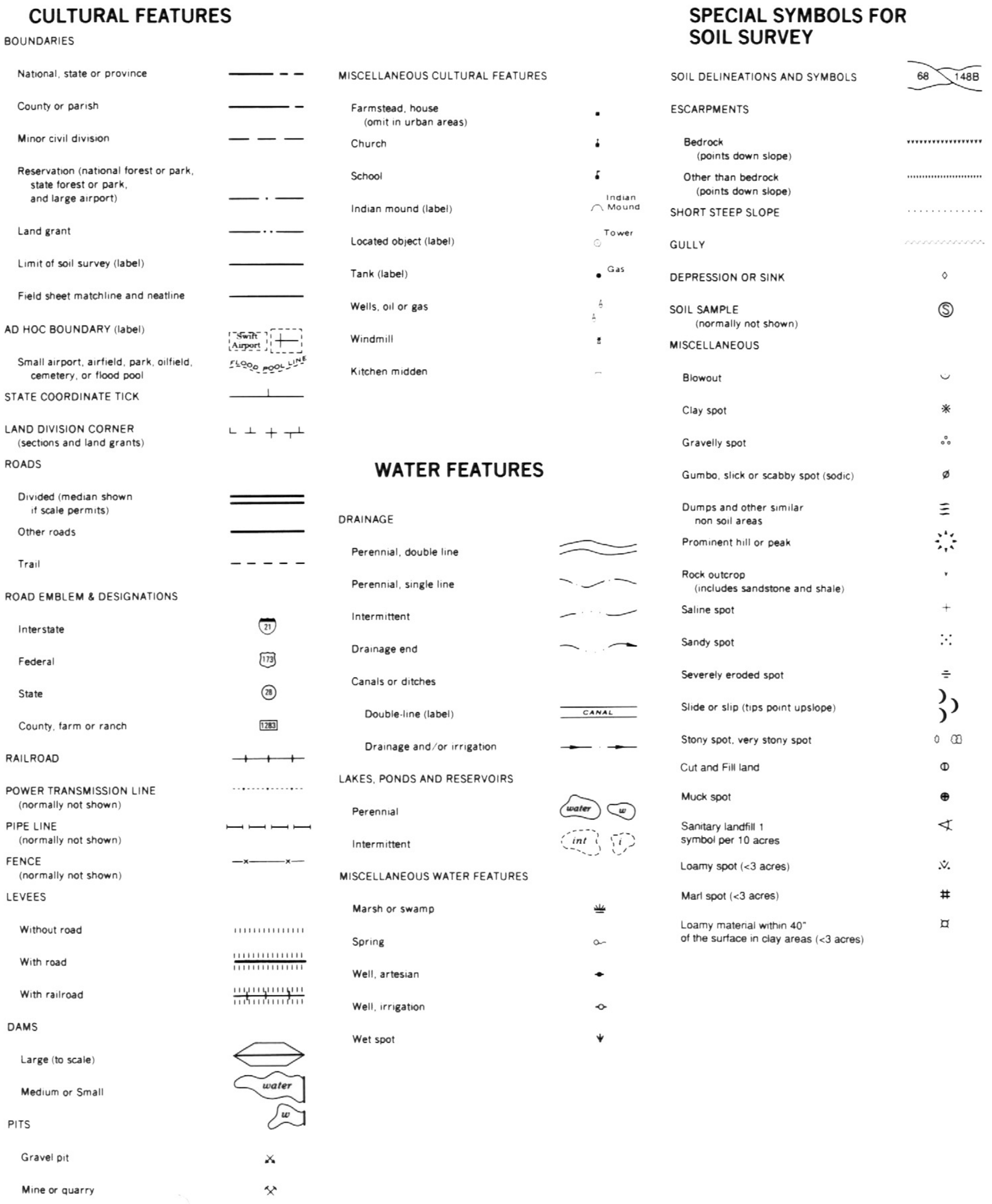
MICHIGAN DEPARTMENT OF AGRICULTURE
MICHIGAN AGRICULTURAL EXPERIMENT STATION
MICHIGAN TECHNOLOGICAL UNIVERSITY

SOIL LEGEND

Map symbols consist of numbers or a combination of numbers and a letter. The initial numbers represent the kind of soil. A capital letter following these numbers indicates the class of slope. Symbols without a slope letter are for nearly level soils or miscellaneous areas.

SYMBOL	NAME	SYMBOL	NAME
10B	Ontonagon silt loam, 2 to 6 percent slopes	87B	Rousseau fine sand, moderately wet, 0 to 6 percent slopes
10D	Ontonagon silt loam, 6 to 15 percent slopes	88A	Croswell-Au Gres sands, 0 to 3 percent slopes
10F	Ontonagon silt loam, 25 to 50 percent slopes	89A	Kinross-Au Gres complex, 0 to 3 percent slopes
11A	Rudyard silty clay loam, 0 to 3 percent slopes	91B	Rousseau fine sand, 0 to 6 percent slopes
12	Pickford silty clay loam	91D	Rousseau fine sand, 6 to 15 percent slopes
13B	Alcona loamy very fine sand, 0 to 6 percent slopes	91E	Rousseau fine sand, 15 to 35 percent slopes
13D	Alcona loamy very fine sand, 6 to 15 percent slopes	92A	Biscuit very fine sandy loam, 0 to 3 percent slopes
13F	Alcona loamy very fine sand, 25 to 50 percent slopes	93F	Ontonagon-Pickford complex, 0 to 50 percent slopes
14A	Gaastra silt loam, 0 to 3 percent slopes	94A	Markey-Kinross-Au Gres complex, 0 to 3 percent slopes
15B	Rousseau fine sand, dark subsoil, 0 to 6 percent slopes	95A	Bowers silt loam, 0 to 3 percent slopes
15D	Rousseau fine sand, dark subsoil, 6 to 15 percent slopes	96B	Velvet-Westbury complex, 0 to 6 percent slopes
15E	Rousseau fine sand, dark subsoil, 15 to 35 percent slopes	97A	Wega very fine sandy loam, 0 to 3 percent slopes
15F	Rousseau fine sand, dark subsoil, 35 to 60 percent slopes	98	Ermatinger silt loam
17D	Deer Park fine sand, 0 to 15 percent slopes	99A	Westbury stony fine sandy loam, 0 to 3 percent slopes
17F	Deer Park fine sand, 25 to 50 percent slopes	101	Chippeny muck
18B	Rubicon sand, 0 to 6 percent slopes	102	Kinross-Dawson complex
18D	Rubicon sand, 6 to 15 percent slopes	103D	Velvet-Rockbottom complex, 6 to 15 percent slopes
18E	Rubicon sand, 15 to 35 percent slopes	103E	Velvet-Rockbottom complex, 15 to 35 percent slopes
19B	Kalkaska sand, 0 to 6 percent slopes	104B	Amasa very fine sandy loam, 0 to 6 percent slopes
19C	Kalkaska sand, 6 to 15 ercent slopes	104D	Amasa very fine sandy loam, 6 to 15 percent slopes
19E	Kalkaska sand, 15 to 35 percent slopes	104F	Amasa very fine sandy loam, 25 to 50 percent slopes
19F	Kalkaska sand, 35 to 60 percent slopes	106A	Potagannissing-Rock outcrop complex, 0 to 3 percent slopes
20A	Croswell sand, 0 to 3 percent slopes	107B	Oldman stony fine sandy loam, 2 to 6 percent slopes
21A	Au Gres sand, 0 to 3 percent slopes	108D	Shelter-Alpena complex, 0 to 15 percent slopes
22	Kinross muck	111	Gutport muck
23	Roscommon muck	112	Soo silty clay loam
25B	Guardlake loam, 0 to 6 percent slopes	113	Ruse mucky fine sandy loam
25D	Guardlake loam, 6 to 15 percent slopes	114B	Velvet very stony loamy sand, 0 to 6 percent slopes
27B	Emmet sandy loam, 1 to 6 percent slopes	114D	Velvet very stony loamy sand, 6 to 15 percent slopes
28B	Longrie sandy loam, 1 to 6 percent slopes	116	Udorthents, nearly level
29A	Solona fine sandy loam, 0 to 3 percent slopes	117B	Manistee sand, 0 to 6 percent slopes
32A	Allendale loamy fine sand, 0 to 3 percent slopes	117D	Manistee sand, 6 to 15 percent slopes
33	Pits, sand and gravel	117F	Manistee sand, 25 to 50 percent slopes
34	Entisols, flooded	119	Gogomain very fine sandy loam
35	Histosols and Aquents, ponded	121B	Rockbottom stony silt loam, 2 to 6 percent slopes
36	Markey and Carbondale mucks	122	Pits, quarry
37	Dawson and Loxley peats	123B	Ocqueoc fine sand, 0 to 6 percent slopes
38F	Deer Park-Kinross complex, 0 to 50 percent slopes	124D	Alpena very cobbly sandy loam, 0 to 15 percent slopes
39D	Au Gres-Dawson-Rubicon complex, 0 to 15 percent slopes	125B	Croswell-Markey complex, 0 to 6 percent slopes
40A	Rudyard-Allendale complex, 0 to 3 percent slopes	126	Pickford silt loam
41D	Summerville-Rock outcrop complex, 1 to 15 percent slopes	127	Gay stony muck
41F	Summerville-Rock outcrop complex, 15 to 45 percent slopes	128F	Alpena-Markey complex, 0 to 50 percent slopes
42D	Emmet-Kalkaska complex, 1 to 15 percent slopes	129A	Rudyard silt loam, 0 to 3 percent slopes
44B	Posen stony fine sandy loam, 1 to 6 percent slopes	130A	Rudyard-Pickford silty clay loams, 0 to 3 percent slopes
44D	Posen stony fine sandy loam, 6 to 15 percent slopes	132B	Sugar very fine sandy loam, 0 to 6 percent slopes
44E	Posen stony fine sandy loam, 15 to 35 percent slopes	132F	Sugar very fine sandy loam, 25 to 50 percent slopes
46B	Pence loamy sand, 0 to 6 percent slopes	133	Dora muck
46D	Pence loamy sand, 6 to 15 percent slopes	135B	Longrie-Posen complex, 0 to 6 percent slopes
46E	Pence loamy sand, 15 to 35 percent slopes	136A	Westbury-Gay complex, 0 to 3 percent slopes
48E	Wainola-Kinross-Rousseau complex, 0 to 35 percent slopes	137A	Kinross-Wainola complex, 0 to 3 percent slopes
49A	Wainola fine sand, 0 to 3 percent slopes	138B	Rousseau, dark subsoil-Urban land complex, 0 to 4 percent slopes
50	Deford fine sand	139A	Rudyard-Urban land complex, 0 to 3 percent slopes
52A	Ingalls loamy sand, 0 to 3 percent slopes	143	Burleigh loamy fine sand
53B	Menominee loamy sand, 0 to 6 percent slopes	144	Urban land-Udorthents complex, nearly level
56A	Ensign silt loam, 0 to 3 percent slopes, rocky	145A	Gaastra-Gogomain-Ingalls complex, 0 to 3 percent slopes
57B	Summerville-Longrie complex, 1 to 6 percent slopes, rocky	146A	Allendale-Fibre complex, 0 to 3 percent slopes
61A	Halfaday sand, 0 to 3 percent slopes	147B	Shelter very stony loam, 0 to 6 percent slopes
67B	Duel-Rock outcrop complex, 1 to 6 percent slopes	147D	Shelter very stony loam, 6 to 15 percent slopes
68	Pinconning mucky loamy sand	148B	Longrie-Rock outcrop complex, 1 to 6 percent slopes
78B	Waiska sandy loam, 0 to 6 percent slopes	149B	Kalkaska sand, 0 to 6 percent slopes, stony
79B	Kalkaska-Manistee sands, 0 to 6 percent slopes	150	Fibre muck
79D	Kalkaska-Manistee sands, 6 to 15 percent slopes	151	Beavertail muck
80B	Superior fine sandy loam, 1 to 6 percent slopes	152	Grousehaven muck
83A	Allendale-Croswell complex, 0 to 3 percent slopes	153	Dumps, limestone
84B	Rousseau, dark subsoil-Alcona complex, 0 to 6 percent slopes	154F	Dawson-Deer Park-Wainola complex, 0 to 50 percent slopes
84D	Rousseau, dark subsoil-Alcona complex, 6 to 15 percent slopes	155B	Allendale-Posen-Pickford complex, 0 to 6 percent slopes
84F	Rousseau, dark subsoil-Alcona complex, 25 to 50 percent slopes	156A	Rockcut-Pinconning complex, 0 to 3 percent slopes
85B	Kalkaska-Ocqueoc complex, 0 to 6 percent slopes	159B	Amasa-Sugar very fine sandy loams, 0 to 6 percent slopes
86A	Ingalls-Halfaday complex, 0 to 3 percent slopes	159F	Amasa-Sugar very fine sandy loams, 25 to 50 percent slopes

CONVENTIONAL AND SPECIAL SYMBOLS LEGEND



CULTURAL FEATURES

BOUNDARIES
- National, state or province
- County or parish
- Minor civil division
- Reservation (national forest or park, state forest or park, and large airport)
- Land grant
- Limit of soil survey (label)
- Field sheet matchline and neatline

AD HOC BOUNDARY (label)
- Small airport, airfield, park, oilfield, cemetery, or flood pool

STATE COORDINATE TICK

LAND DIVISION CORNER (sections and land grants)

ROADS
- Divided (median shown if scale permits)
- Other roads
- Trail

ROAD EMBLEM & DESIGNATIONS
- Interstate
- Federal
- State
- County, farm or ranch

RAILROAD

POWER TRANSMISSION LINE (normally not shown)

PIPE LINE (normally not shown)

FENCE (normally not shown)

LEVEES
- Without road
- With road
- With railroad

DAMS
- Large (to scale)
- Medium or Small

PITS
- Gravel pit
- Mine or quarry

MISCELLANEOUS CULTURAL FEATURES
- Farmstead, house (omit in urban areas)
- Church
- School
- Indian mound (label)
- Located object (label)
- Tank (label)
- Wells, oil or gas
- Windmill
- Kitchen midden

WATER FEATURES

DRAINAGE
- Perennial, double line
- Perennial, single line
- Intermittent
- Drainage end
- Canals or ditches
  - Double-line (label)
  - Drainage and/or irrigation

LAKES, PONDS AND RESERVOIRS
- Perennial
- Intermittent

MISCELLANEOUS WATER FEATURES
- Marsh or swamp
- Spring
- Well, artesian
- Well, irrigation
- Wet spot

SPECIAL SYMBOLS FOR SOIL SURVEY

SOIL DELINEATIONS AND SYMBOLS

ESCARPMENTS
- Bedrock (points down slope)
- Other than bedrock (points down slope)

SHORT STEEP SLOPE

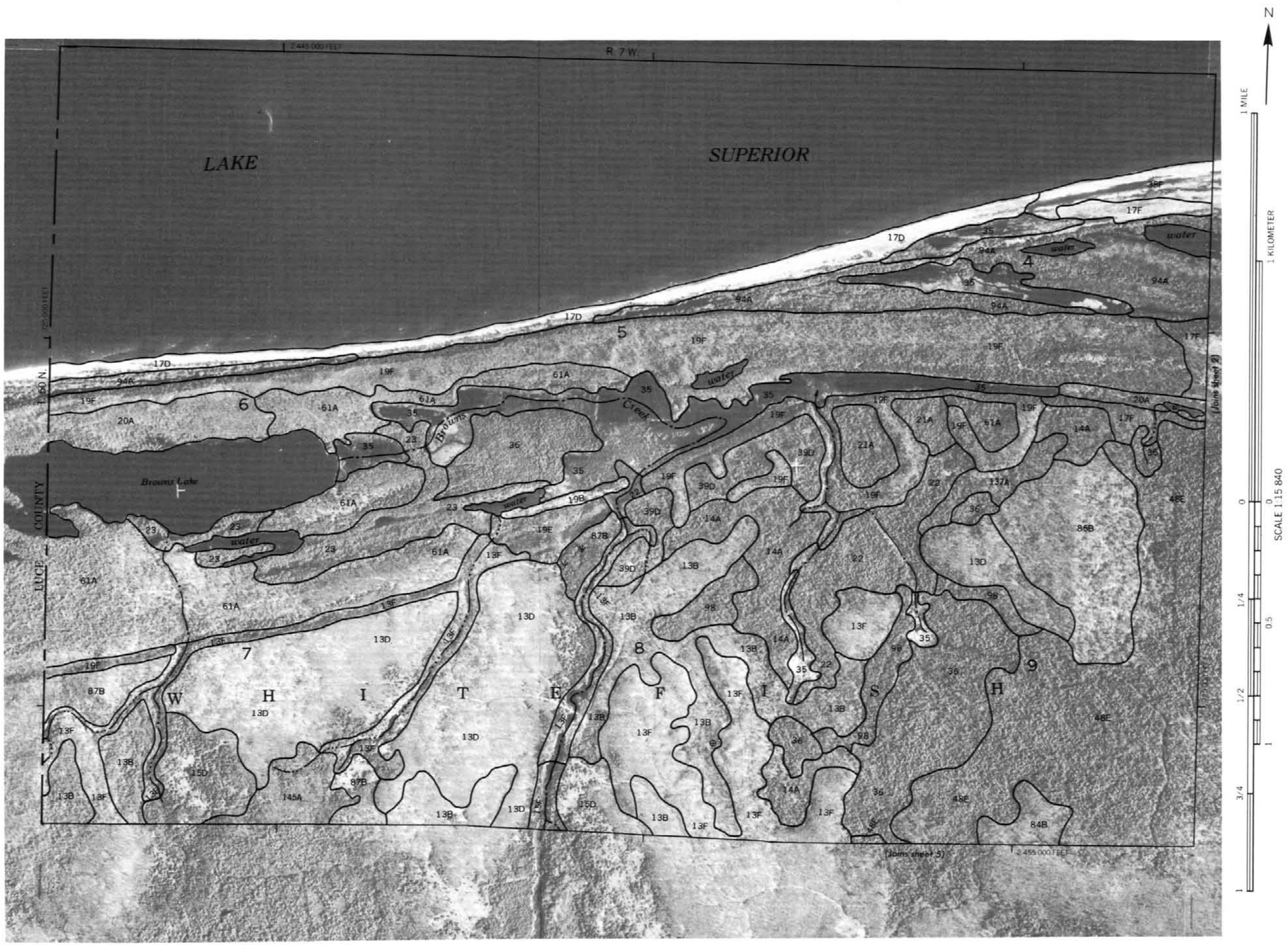
GULLY

DEPRESSION OR SINK

SOIL SAMPLE (normally not shown)

MISCELLANEOUS
- Blowout
- Clay spot
- Gravelly spot
- Gumbo, slick or scabby spot (sodic)
- Dumps and other similar non soil areas
- Prominent hill or peak
- Rock outcrop (includes sandstone and shale)
- Saline spot
- Sandy spot
- Severely eroded spot
- Slide or slip (tips point upslope)
- Stony spot, very stony spot
- Cut and Fill land
- Muck spot
- Sanitary landfill 1 symbol per 10 acres
- Loamy spot (<3 acres)
- Marl spot (<3 acres)
- Loamy material within 40" of the surface in clay areas (<3 acres)

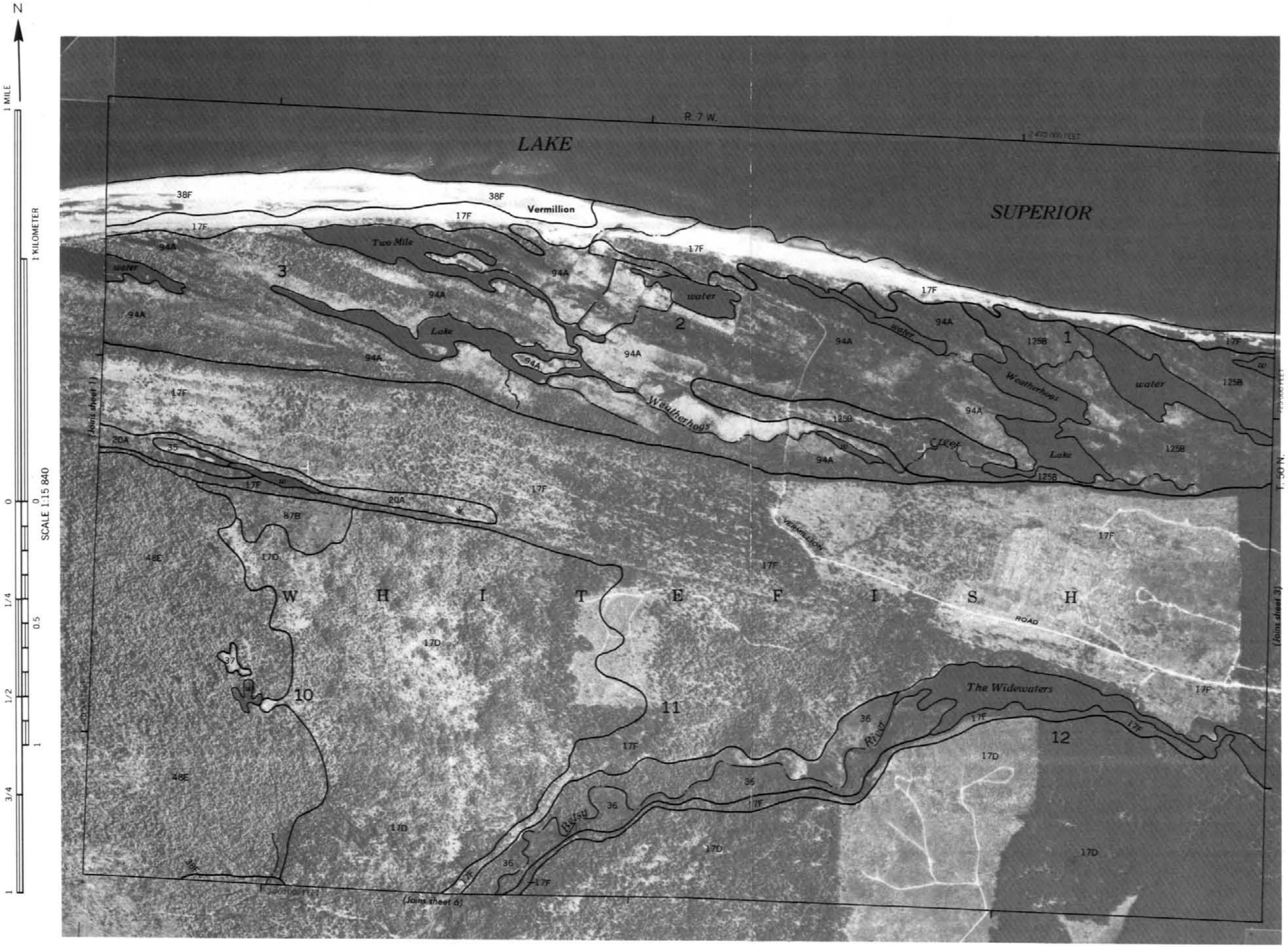
①


LAKE
SUPERIOR
N
R. 7 W.
2 445 000 FEET
725 000 FEET
T. 50 N.
LUCE COUNTY
Browns Lake
Browns Creek
water
W H I T E F I S H
4
5
6
7
8
9
17D
17F
94A
35
36
19F
19B
19E
20A
21A
22
23
61A
39D
14A
13B
13D
13F
15D
145A
87B
9B
85B
84B
48E
137A
(Joins sheet 2)
(Joins sheet 5)
2 455 000 FEET
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

CHIPPEWA COUNTY, MICHIGAN NO. 1

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 2


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
LAKE
SUPERIOR
R. 7 W.
2 470 000 FEET
Vermillion
38F
17F
94A
water
Two Mile
Lake
Weatherhogs
Creek
Lake
125B
w
20A
35
87B
17D
48E
37
36
Betsy
River
The Widewaters
W H I T E F I S H
VERMILLION
ROAD
(Joins sheet 1)
(Joins sheet 3)
(Joins sheet 6)
T. 50 N.
1
2
3
10
11
12

CHIPPEWA COUNTY, MICHIGAN NO. 2

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]

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 3

③

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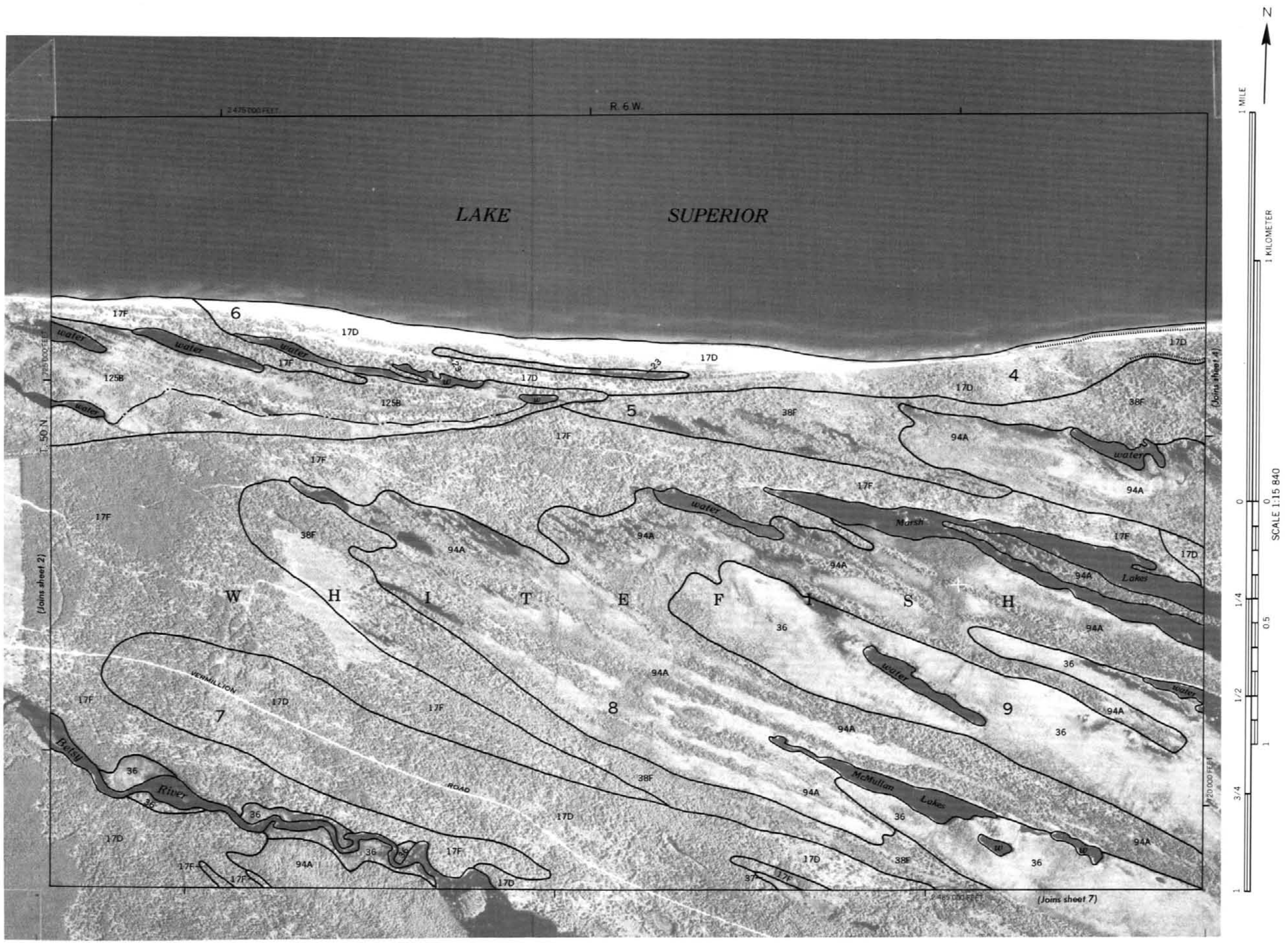
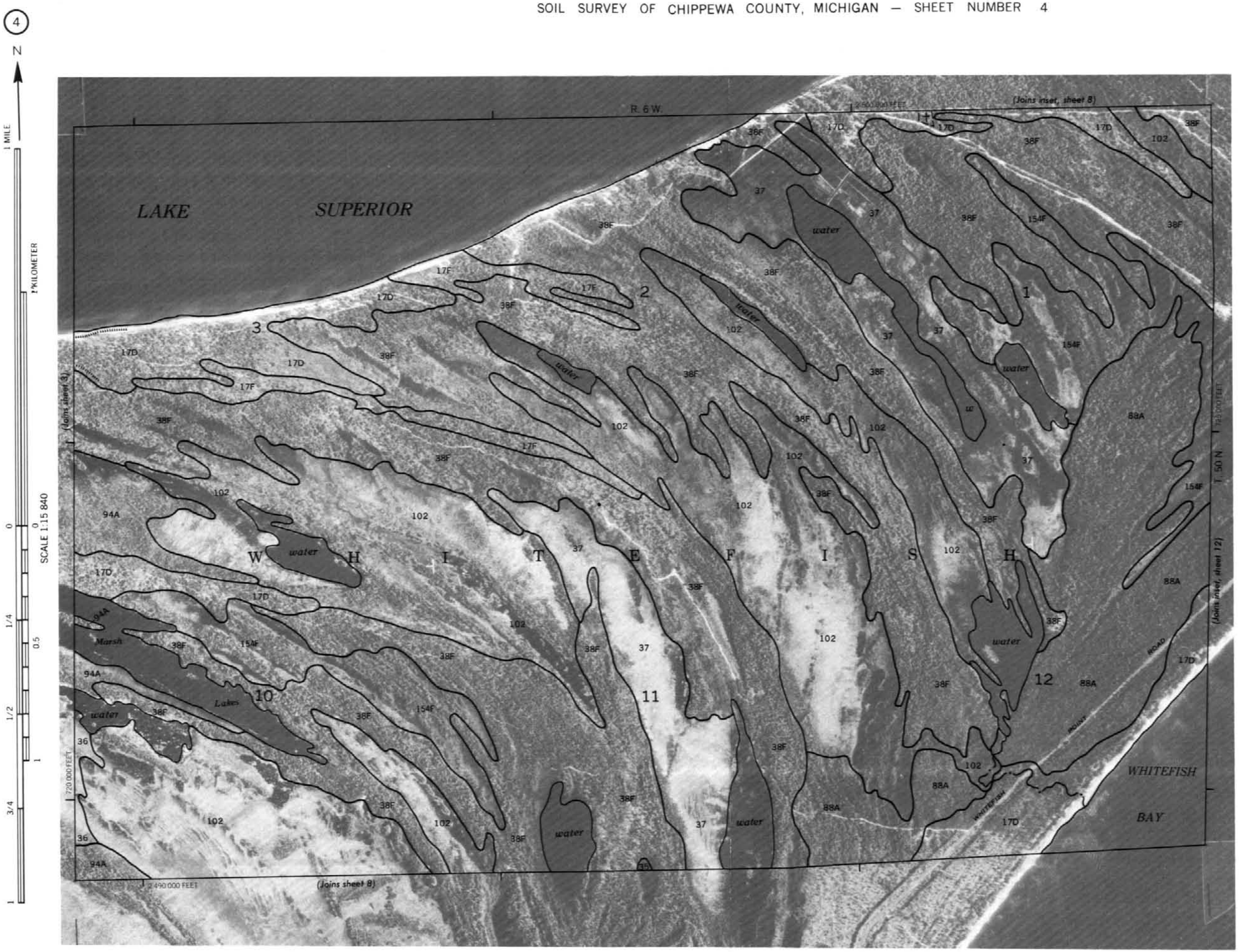
CHIPPEWA COUNTY, MICHIGAN NO. 3


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
R. 6 W.
2 475 000 FEET
T. 50 N.
LAKE SUPERIOR
(Joins sheet 2)
(Joins sheet 4)
(Joins sheet 7)
2 485 000 FEET
720 000 FEET
WHITEFISH
4
5
6
7
8
9
17F
17D
125B
38F
94A
36
37
23
water
w
Marsh
Lakes
McMullan Lakes
Betsy River
VERMILLION ROAD


4
N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
SCALE 1:15 840
R. 6 W.
(Joins inset, sheet 8)
2 560 000 FEET
LAKE
SUPERIOR
(Joins sheet 3)
(Joins inset, sheet 12)
T. 50 N.
735 000 FEET
720 000 FEET
2 490 000 FEET
(Joins sheet 8)
WHITEFISH
BAY
WHITEFISH POINT ROAD
W H I T E F I S H
1
2
3
10
11
12
17D
17F
36
37
38F
88A
94A
102
154F
35
water
w
Marsh
Lakes

CHIPPEWA COUNTY, MICHIGAN NO. 4

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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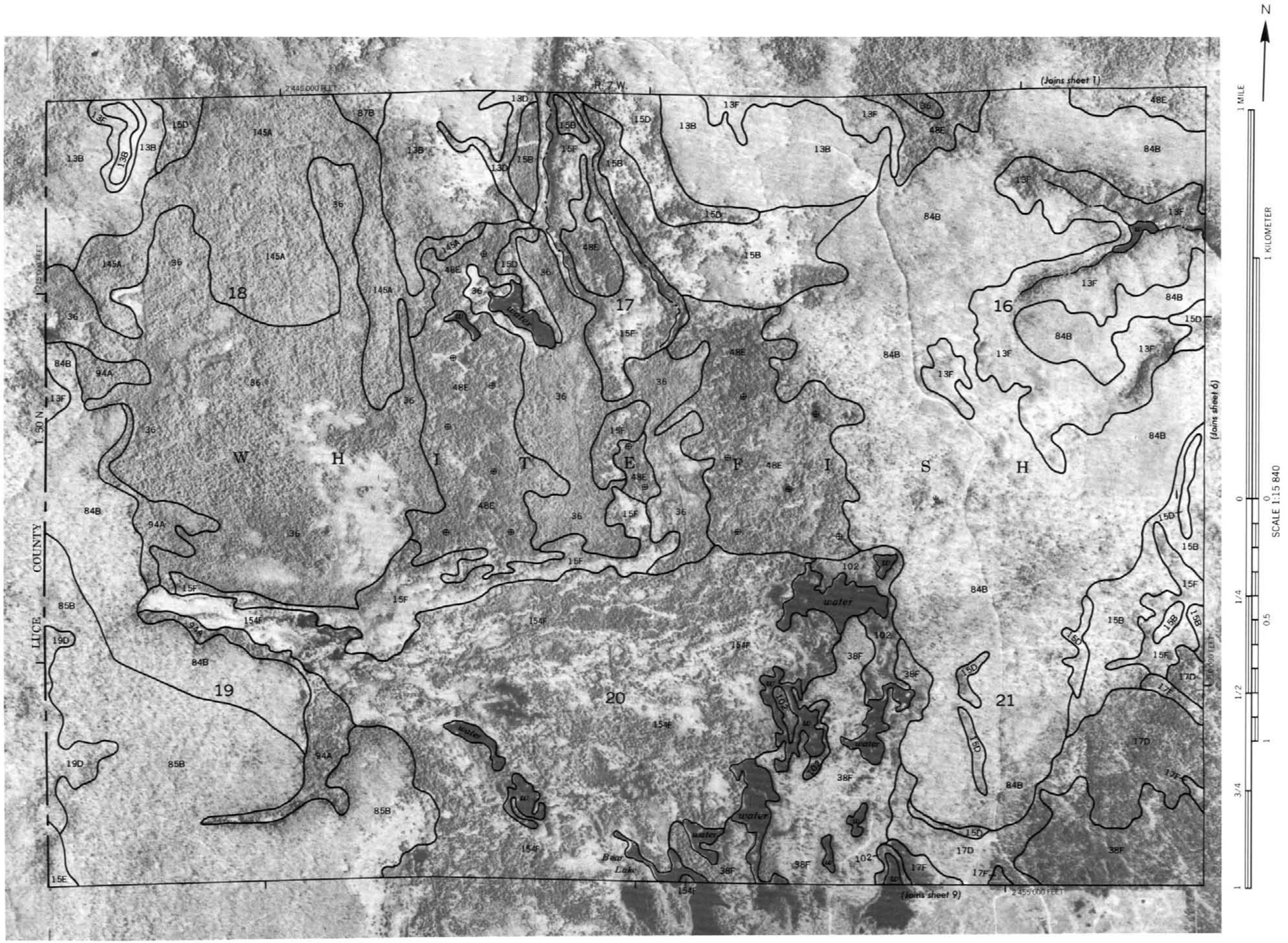
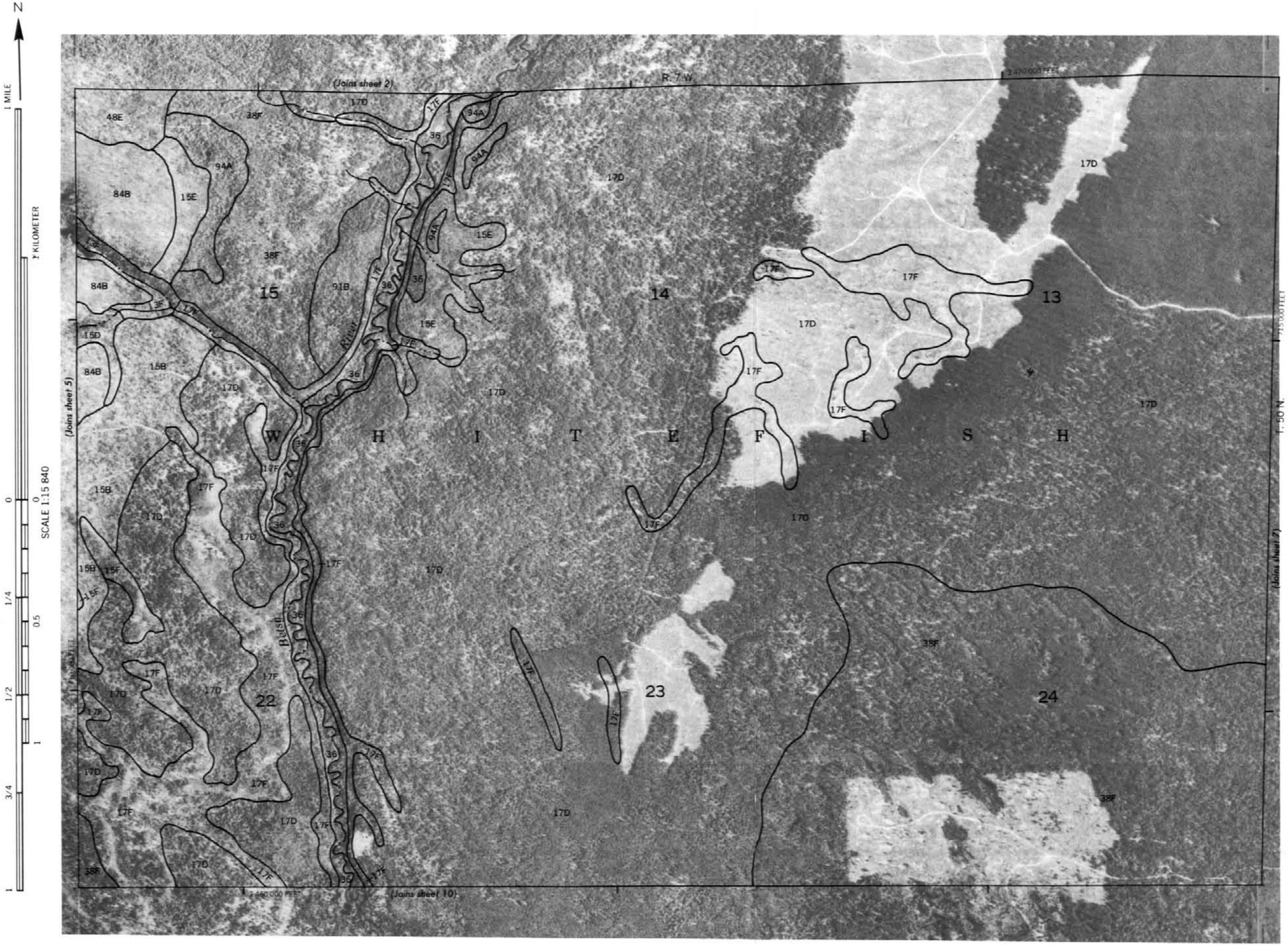
CHIPPEWA COUNTY, MICHIGAN NO. 5


N
(Joins sheet 1)
R. 7 W.
2 445 000 FEET
T. 50 N.
LUCE COUNTY
(Joins sheet 6)
(Joins sheet 9)
2 455 000 FEET
W H I T E F I S H
16
17
18
19
20
21
13B
13D
13F
15B
15D
15E
15F
17D
17F
19D
36
38F
48E
84B
85B
87B
94A
102
145A
154F
water
w
Bear Lake
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

⑥

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 6


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
(Joins sheet 2)
R. 7 W.
2 470 000 FEET
(Joins sheet 5)
(Joins sheet 7)
(Joins sheet 10)
2 460 000 FEET
715 000 FEET
T. 50 N.
W H I T E F I S H
River
Betsy
15
14
13
22
23
24
48E
38F
84B
15E
94A
91B
36
17D
17F
15D
15B
15F

CHIPPEWA COUNTY, MICHIGAN NO. 6

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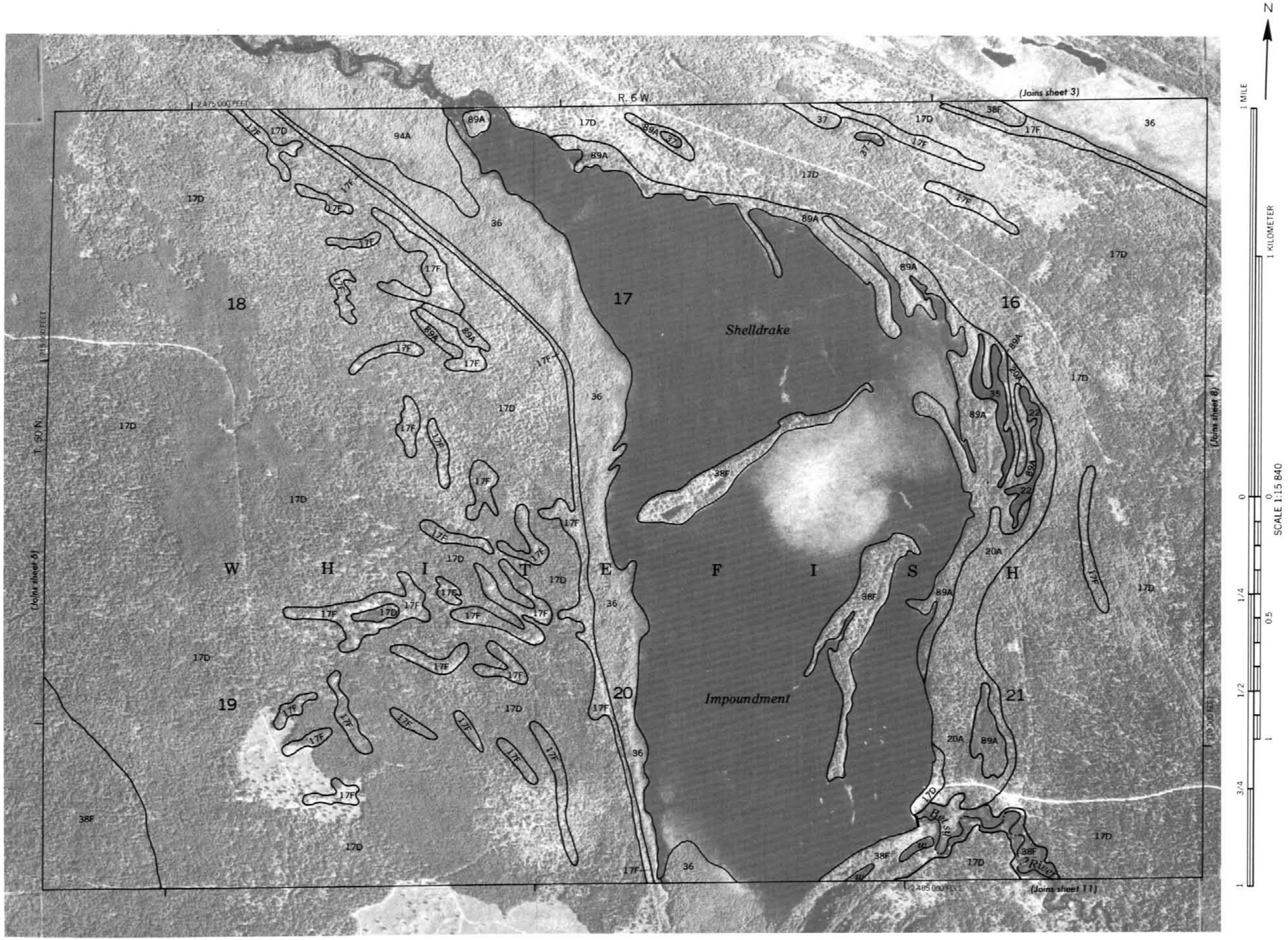
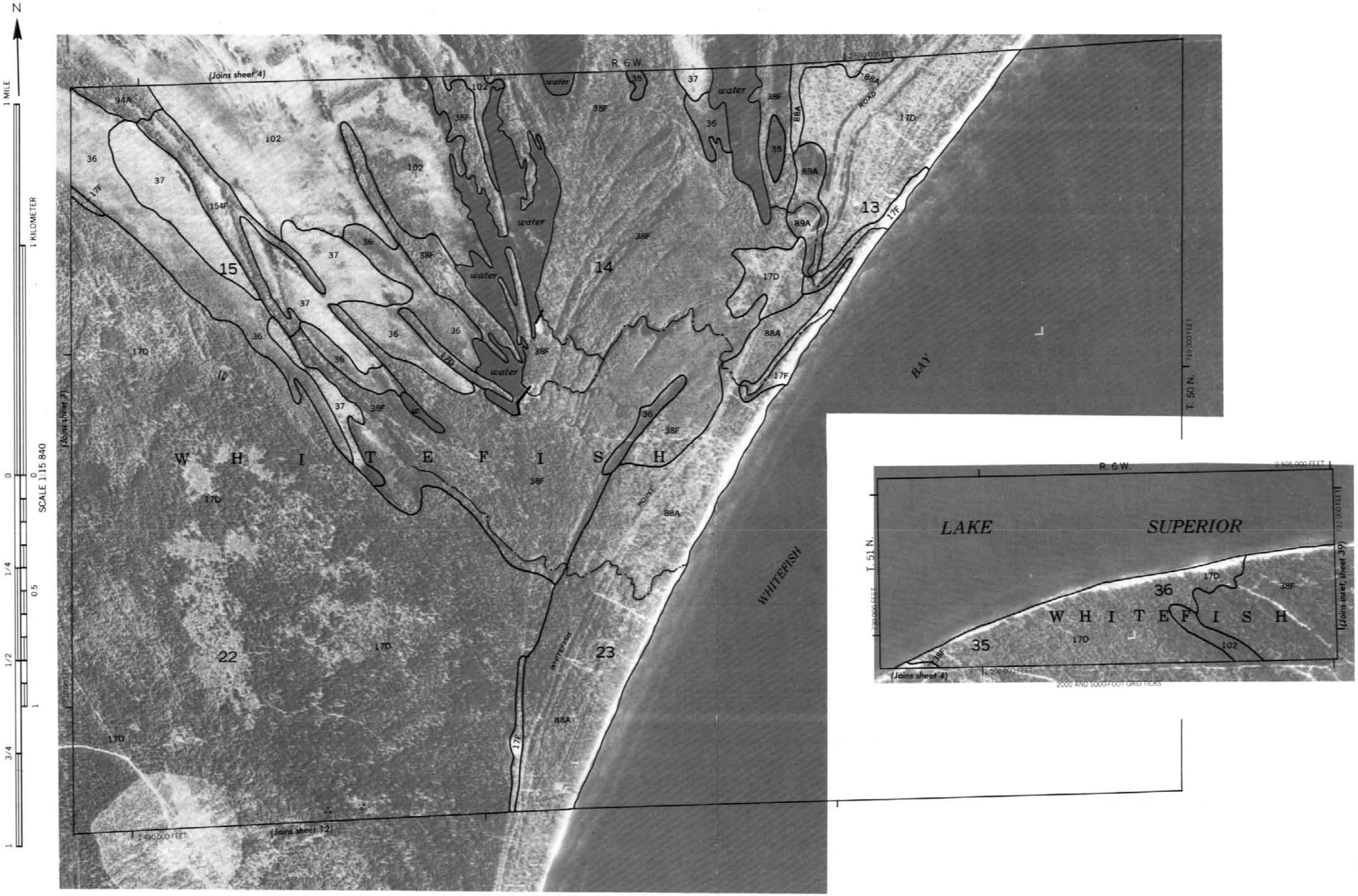
CHIPPEWA COUNTY, MICHIGAN NO. 7


⑦
N
(Joins sheet 3)
R. 6 W.
2 475 000 FEET
T. 50 N.
(Joins sheet 6)
(Joins sheet 8)
(Joins sheet 11)
2 485 000 FEET
18
17
16
19
20
21
W H I T E F I S H
Shelldrake
Impoundment
Betsy River
17D
17F
36
37
38F
89A
94A
20A
22
35
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 8


N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
SCALE 1:15 840
(Joins sheet 4)
R. 6 W.
2 490 000 FEET
(Joins sheet 7)
(Joins sheet 12)
T. 50 N.
715 000 FEET
94A
102
36
37
17F
154F
15
38F
water
35
88A
89A
17D
ROAD
13
14
88A
BAY
W H I T E F I S H
POINT
22
23
WHITEFISH
R. 6 W.
2 505 000 FEET
LAKE
SUPERIOR
T. 51 N.
730 000 FEET
(Joins inset, sheet 39)
(Joins sheet 4)
2 500 000 FEET
2000 AND 5000-FOOT GRID TICKS

CHIPPEWA COUNTY, MICHIGAN NO. 8

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

⑨

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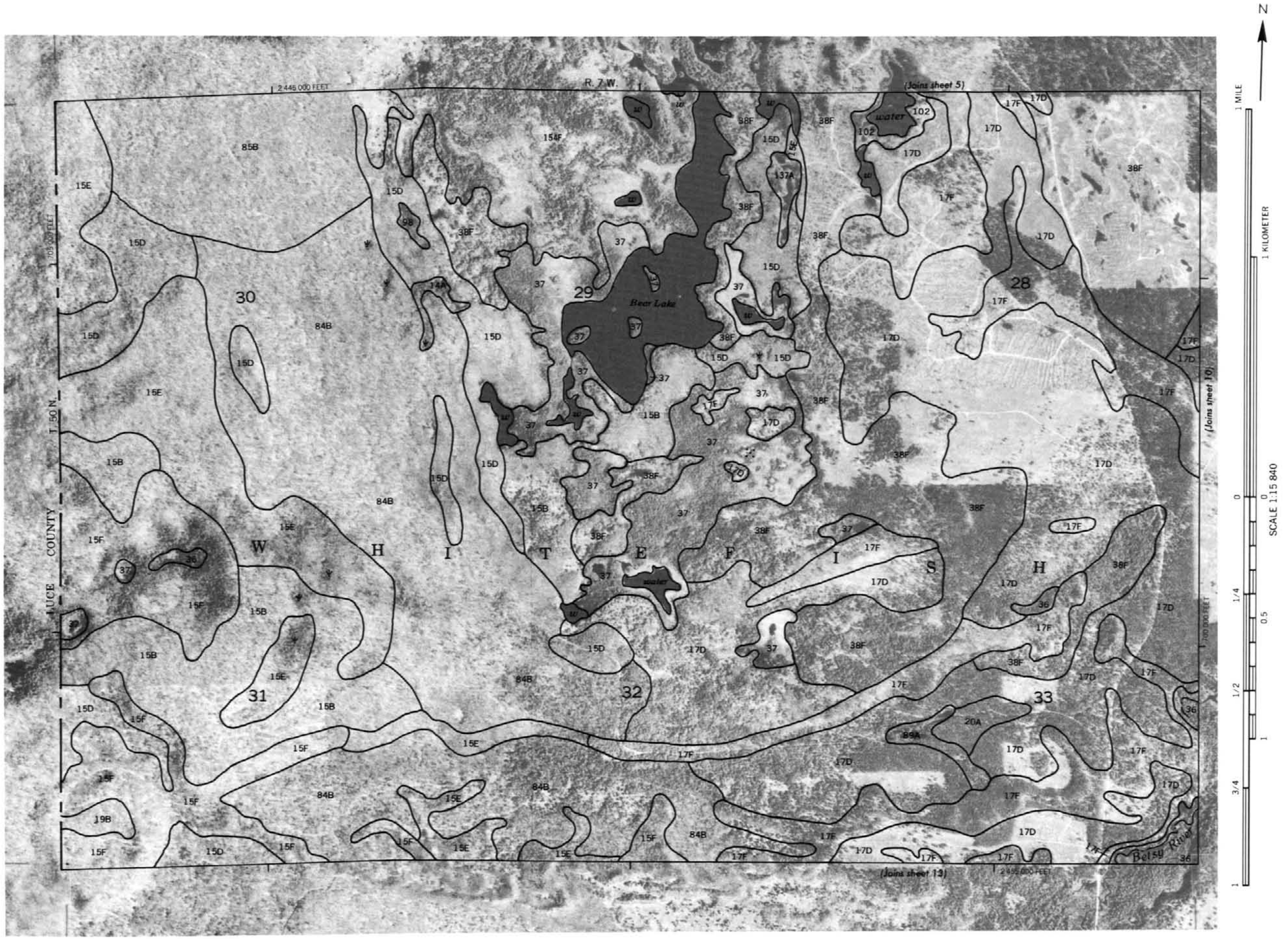
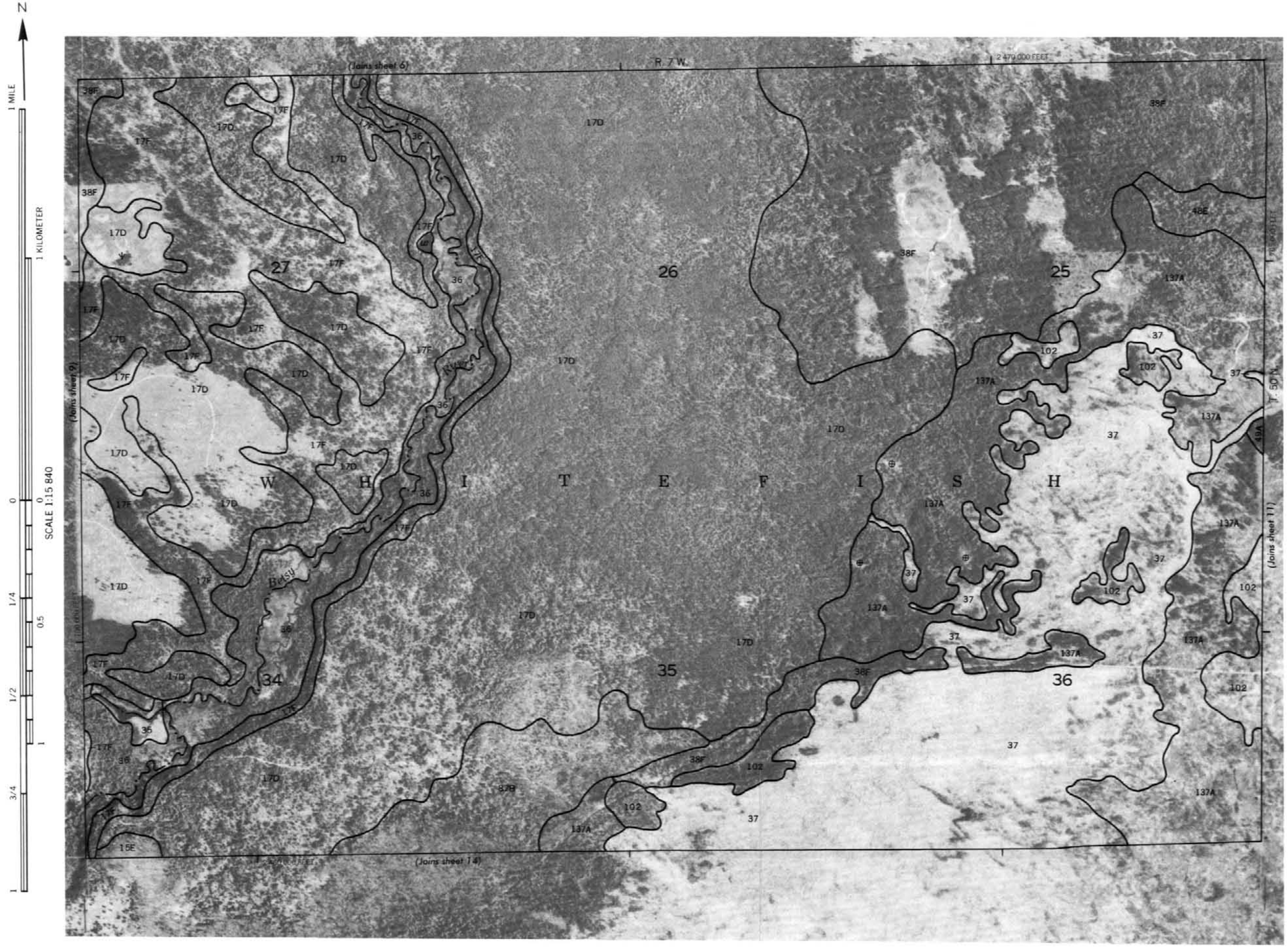
CHIPPEWA COUNTY, MICHIGAN NO. 9

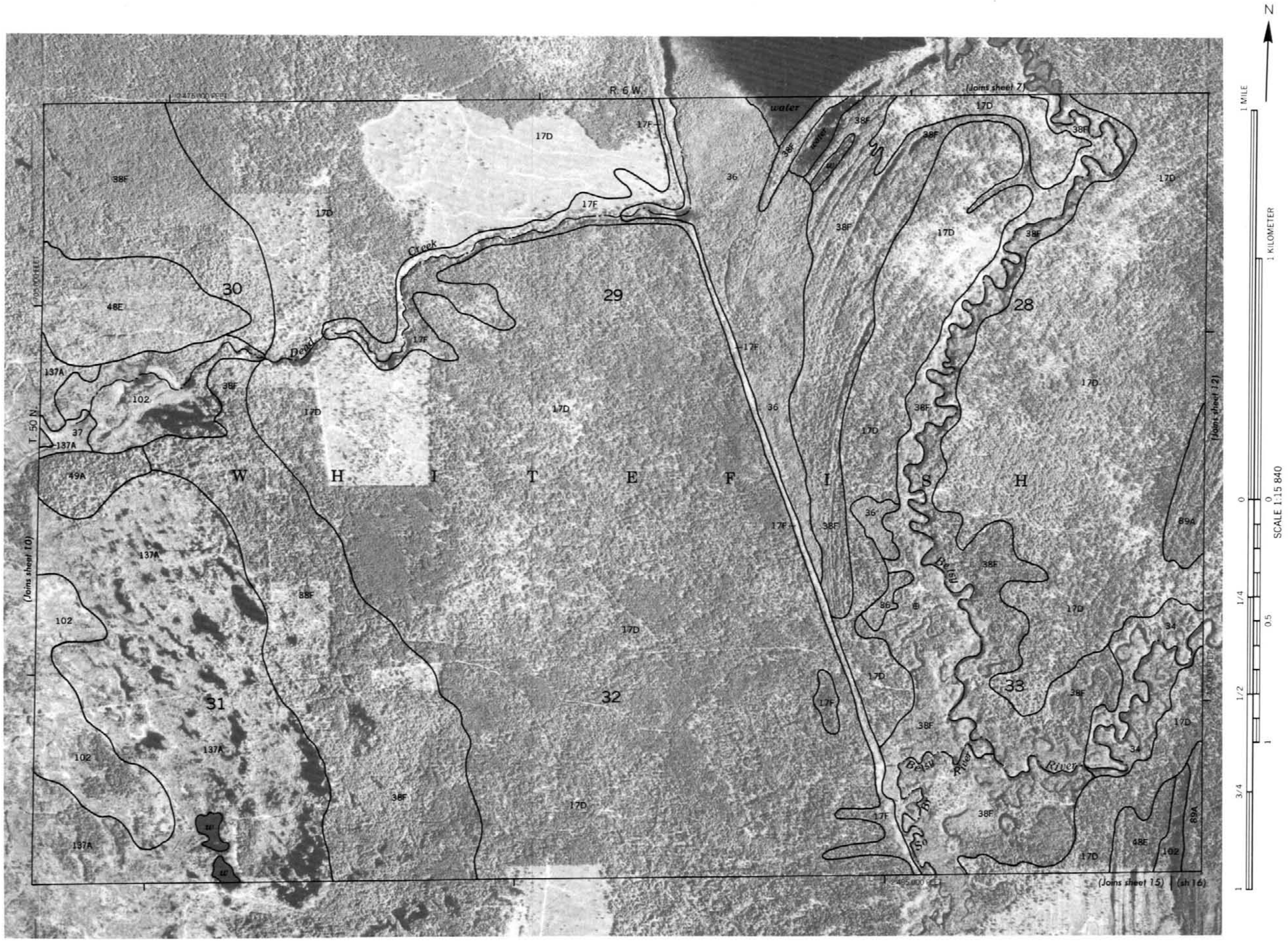

N
2 446 000 FEET
R. 7 W.
(Joins sheet 5)
(Joins sheet 10)
(Joins sheet 13)
2 455 000 FEET
705 000 FEET
700 000 FEET
T. 50 N.
LUCE COUNTY
WHITEFISH
Bear Lake
water
Betsy River
28
29
30
31
32
33
85B
84B
15B
15D
15E
15F
17D
17F
19B
20A
36
37
38F
89A
98
102
137A
154F
w
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 10


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 6)
R. 7 W.
2 470 000 FEET
(Joins sheet 9)
(Joins sheet 11)
(Joins sheet 14)
T. 50 N.
27
26
25
34
35
36
W H I T E F I S H
River
Betsy
15E
17D
17F
36
37
38F
48E
49A
87B
102
137A

CHIPPEWA COUNTY, MICHIGAN NO. 10

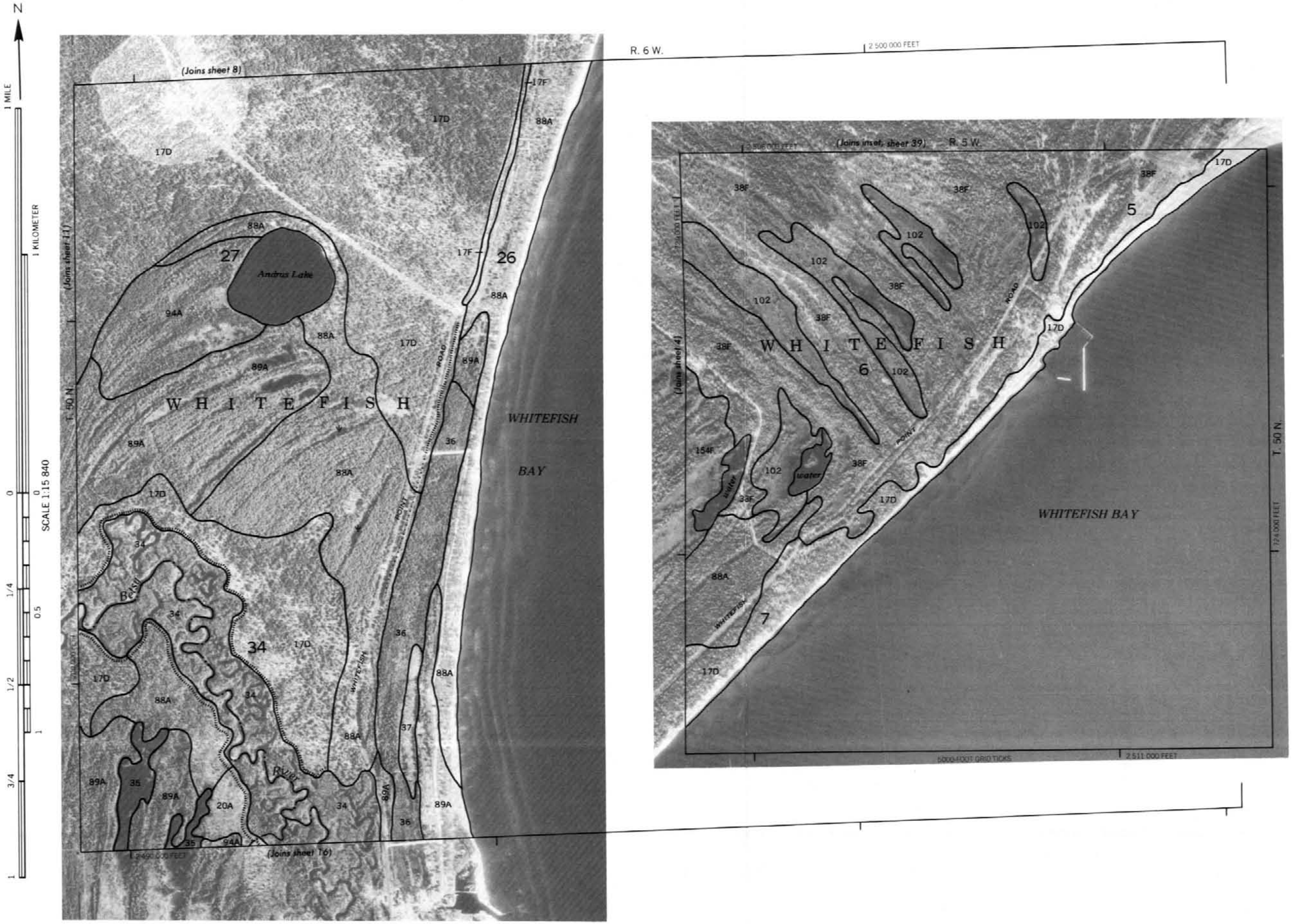
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
R. 6 W.
T. 50 N.
(Joins sheet 7)
(Joins sheet 10)
(Joins sheet 12)
(Joins sheet 15)
(sh 16)
W H I T E F I S H
Dead Creek
Betsy River
So Br
water
w
28
29
30
31
32
33
17D
17F
34
36
37
38F
48E
49A
89A
102
137A
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 11

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 12


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 8)
R. 6 W.
2 500 000 FEET
(Joins sheet 11)
T. 50 N.
(Joins sheet 16)
2 490 000 FEET
17F
17D
88A
27
26
Andrus Lake
94A
89A
W H I T E F I S H
ROAD
POINT
WHITEFISH
WHITEFISH
BAY
36
37
34
Bath
River
35
20A
(Joins inset, sheet 39)
R. 5 W.
(Joins sheet 4)
38F
102
5
6
7
154F
water
ROAD
POINT
WHITEFISH BAY
T. 50 N.
724 000 FEET
5000-FOOT GRID TICKS
2 511 000 FEET

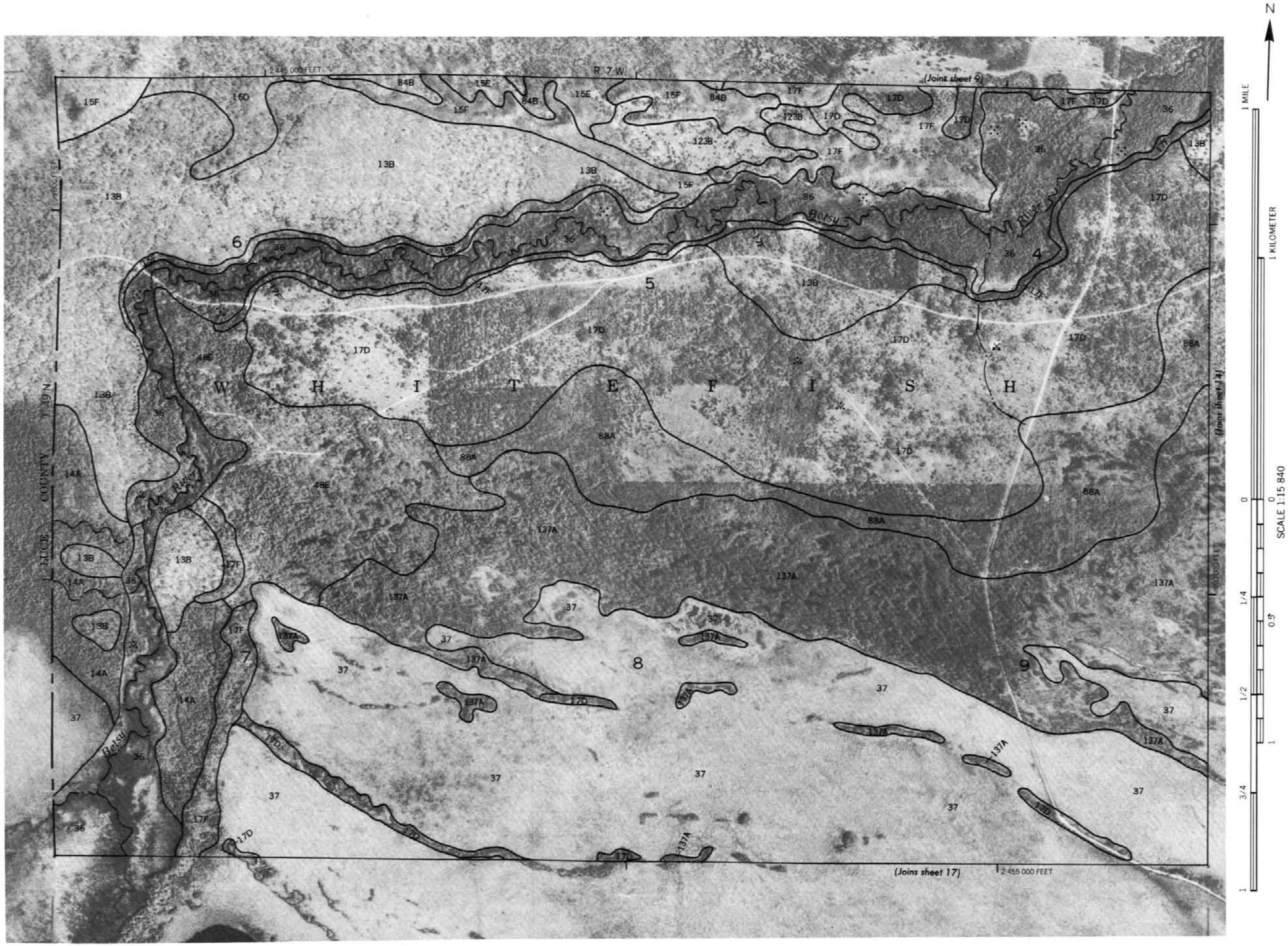
CHIPPEWA COUNTY, MICHIGAN NO. 12

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

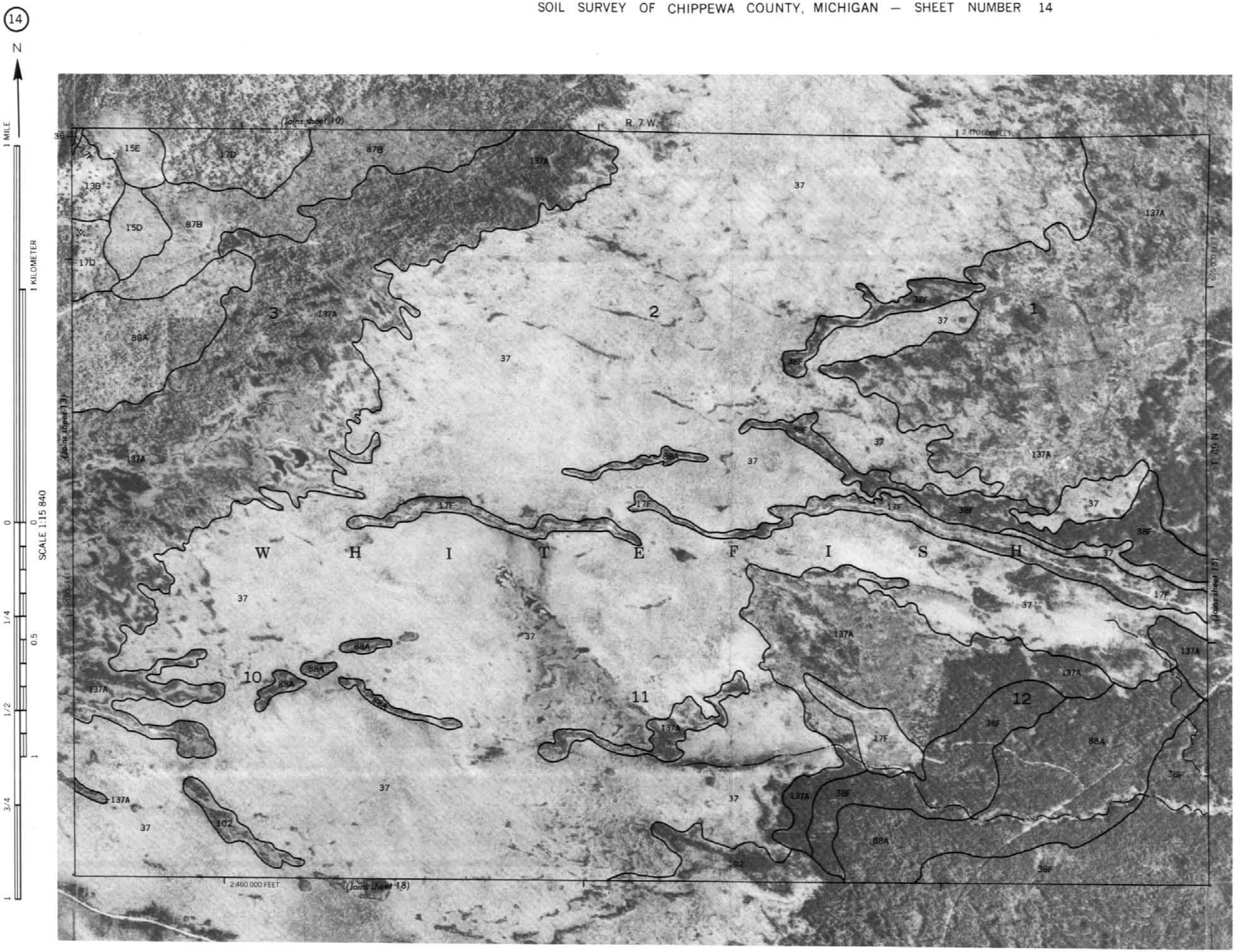
SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 13

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 13


N
R. 7 W.
2 445 000 FEET
(Joins sheet 9)
(Joins sheet 14)
(Joins sheet 17)
2 455 000 FEET
T. 49 N.
LUCE COUNTY
W H I T E F I S H
Betsy River
4
5
6
7
8
9
15F
16D
84B
15E
15F
123B
17F
17D
36
13B
48E
14A
37
88A
137A
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

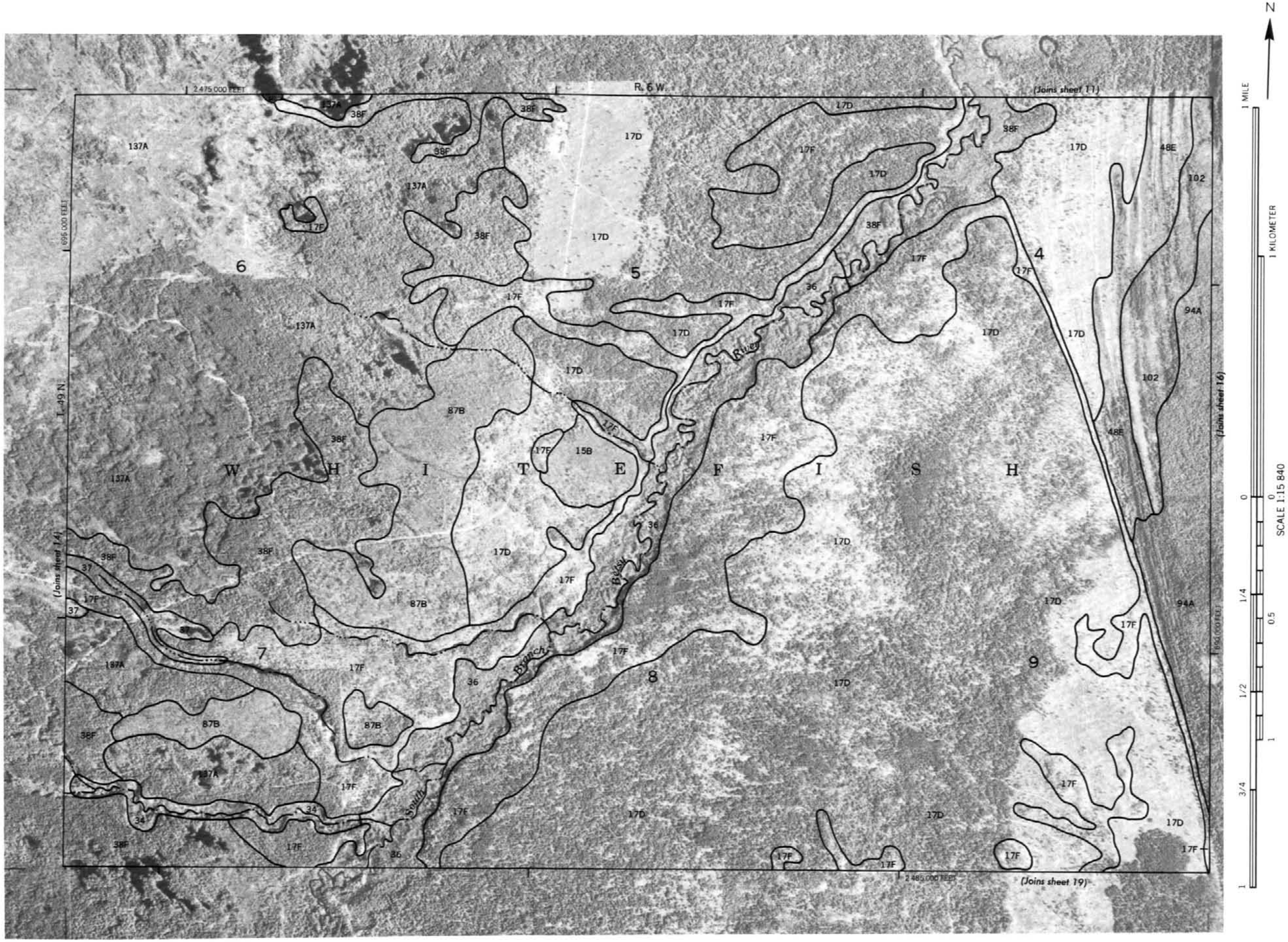
SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 14



(14)
N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 10)
R. 7 W.
2 470 000 FEET
(Joins sheet 13)
(Joins sheet 15)
T. 49 N.
2 460 000 FEET
(Joins sheet 18)
36
15E
17D
87B
137A
13B
15D
87B
17D
37
137A
3
137A
88A
2
1
38F
37
37
38F
38F
37
37
137A
88A
137A
17F
17F
17F
38F
37
38F
37
W
H
I
T
E
F
I
S
H
37
37
17F
37
137A
88A
137A
10
88A
88A
88A
137A
11
12
137A
38F
17F
88A
38F
37
37
137A
37
137A
38F
102
88A
82
38F

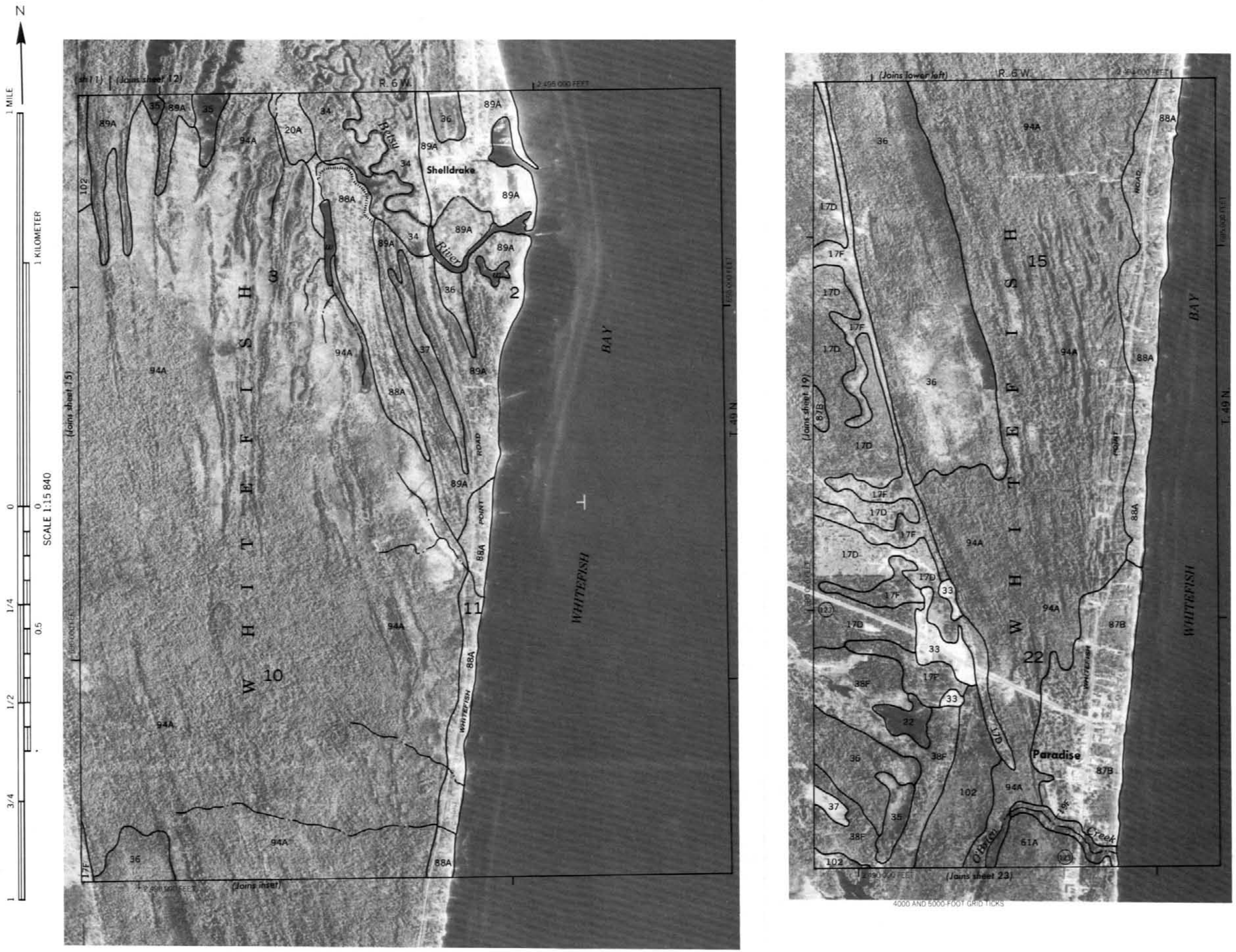
CHIPPEWA COUNTY, MICHIGAN NO. 14

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
R. 6 W.
T. 49 N.
2 475 000 FEET
695 000 FEET
2 485 000 FEET
(Joins sheet 11)
(Joins sheet 14)
(Joins sheet 16)
(Joins sheet 19)
W H I T E F I S H
6
5
4
7
8
9
River
Branch
Betsy
South
137A
38F
17D
17F
48E
102
94A
36
87B
15B
37
34
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 15

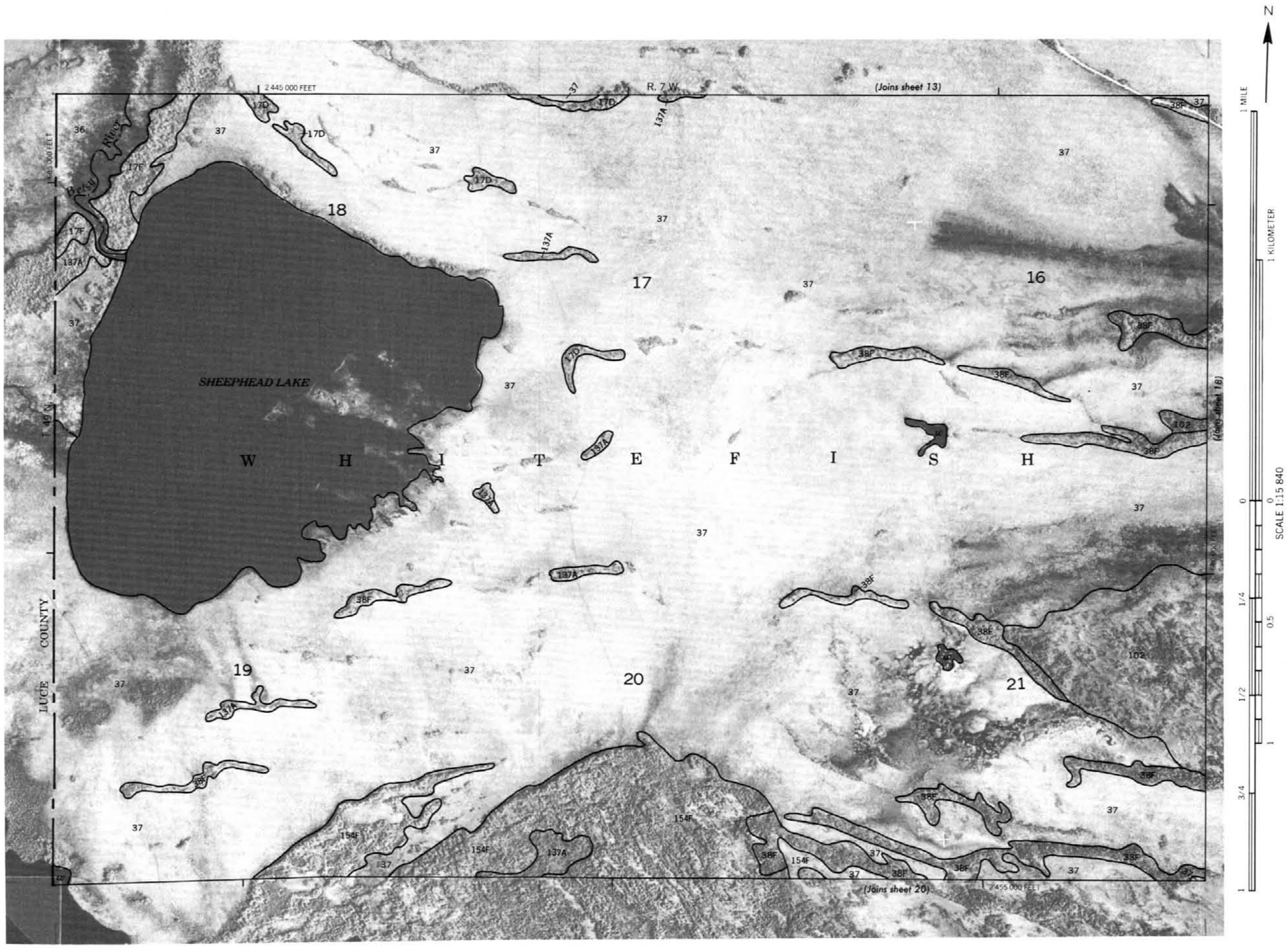

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
(sh11) (Joins sheet 12)
R. 6 W.
2 495 000 FEET
Betsy River
Shelldrake
WHITEFISH
WHITEFISH BAY
POINT ROAD
(Joins sheet 15)
(Joins inset)
T. 49 N.
3
2
10
11
89A
94A
88A
20A
34
35
36
37
102
17F
(Joins lower left)
(Joins sheet 19)
(Joins sheet 23)
Paradise
Creek
15
22
17D
17F
33
38F
61A
87B
4000 AND 5000-FOOT GRID TICKS

CHIPPEWA COUNTY, MICHIGAN NO. 16

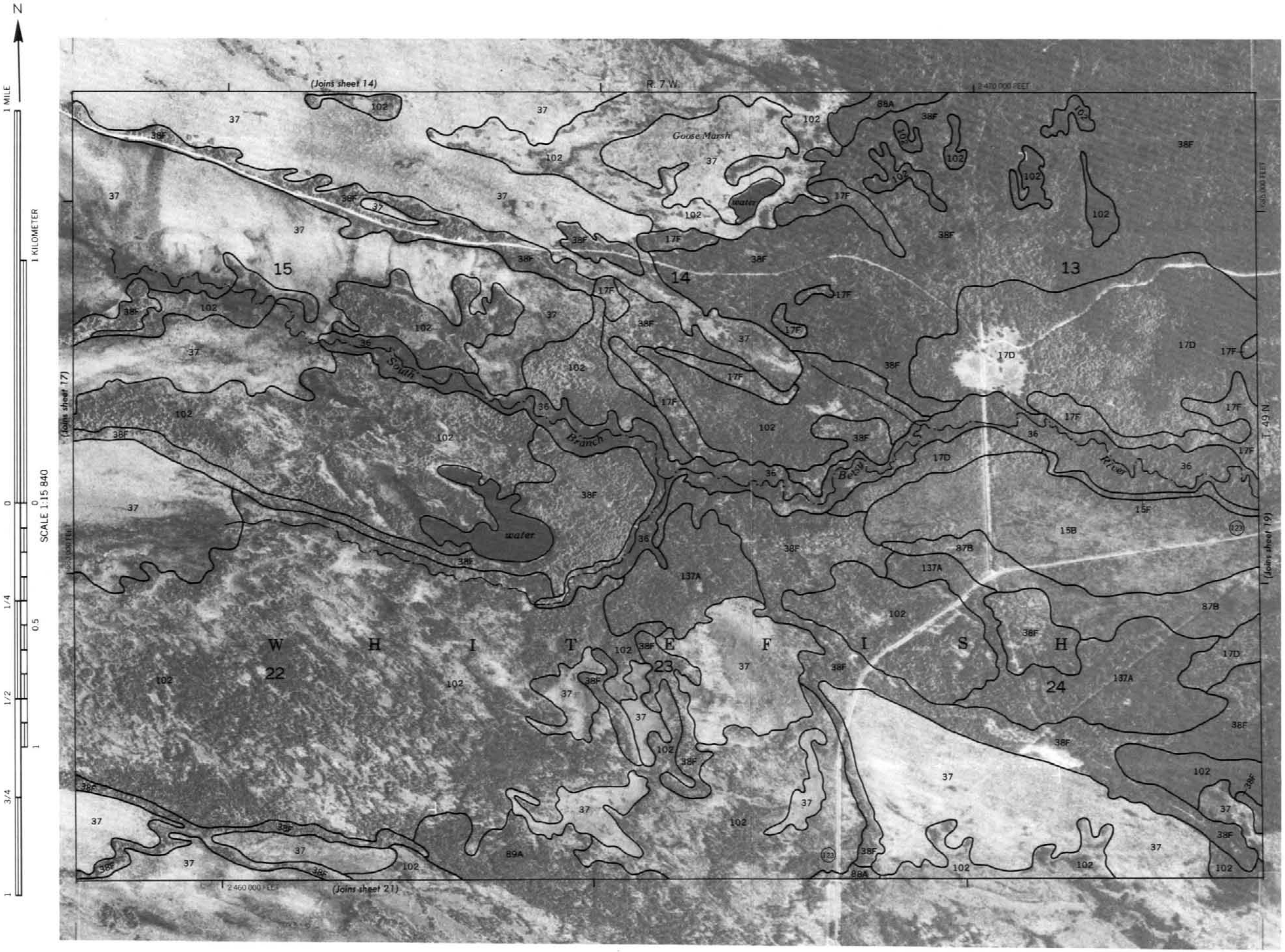
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 17

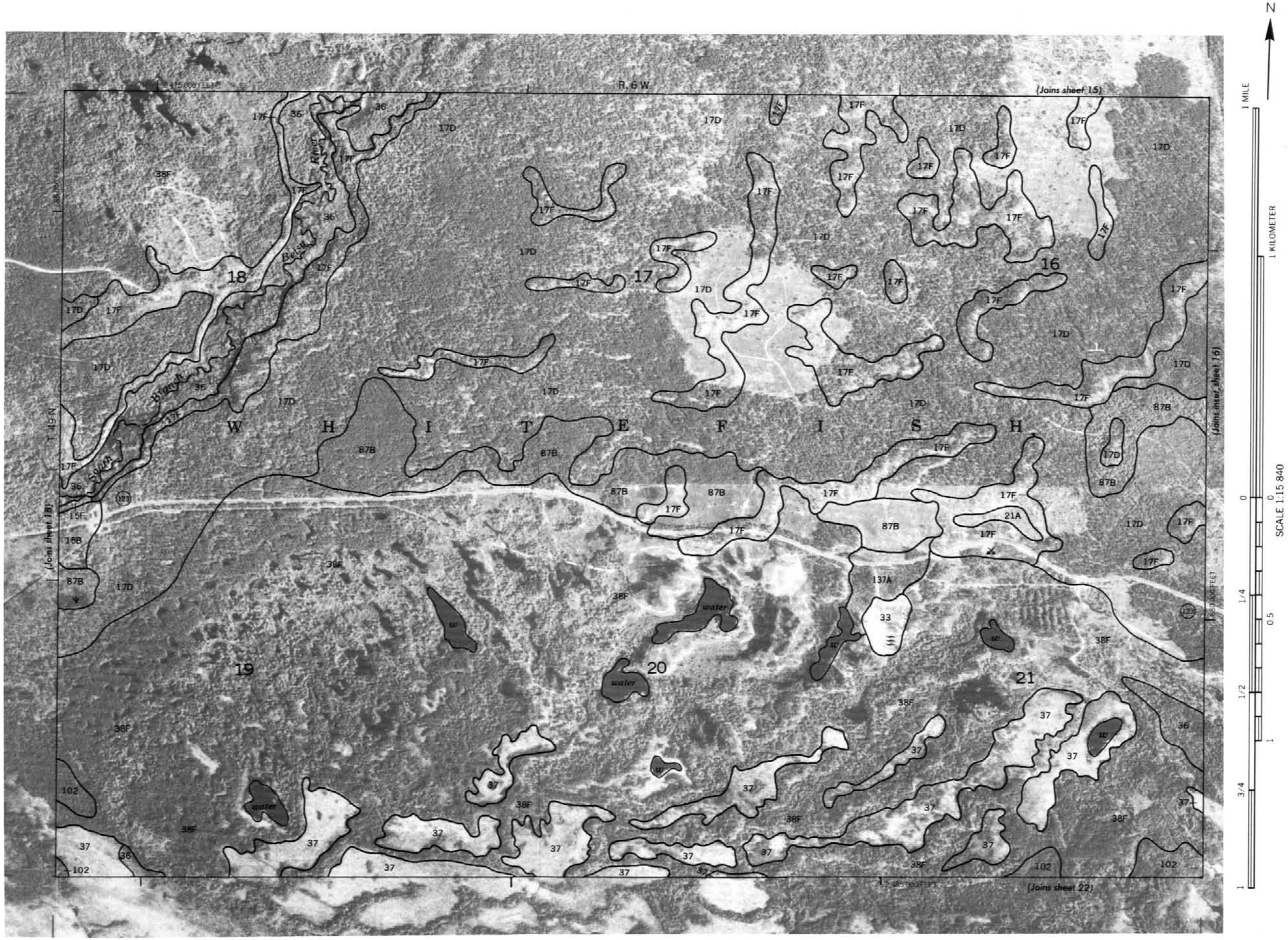

(Joins sheet 13)
(Joins sheet 18)
(Joins sheet 20)
2 445 000 FEET
2 455 000 FEET
R. 7 W.
T. 49 N.
LUCE COUNTY
Betsy River
SHEEPHEAD LAKE
W H I T E F I S H
16
17
18
19
20
21
36
37
17D
17F
137A
38F
102
154F
N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 18


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 14)
R. 7 W.
2 470 000 FEET
Goose Marsh
water
South Branch
Betsy River
15
14
13
22
23
24
W H I T E F I S H
T. 49 N.
(Joins sheet 17)
(Joins sheet 19)
(Joins sheet 21)
2 460 000 FEET
123
37
38F
102
17F
17D
36
15B
15F
87B
88A
89A
137A

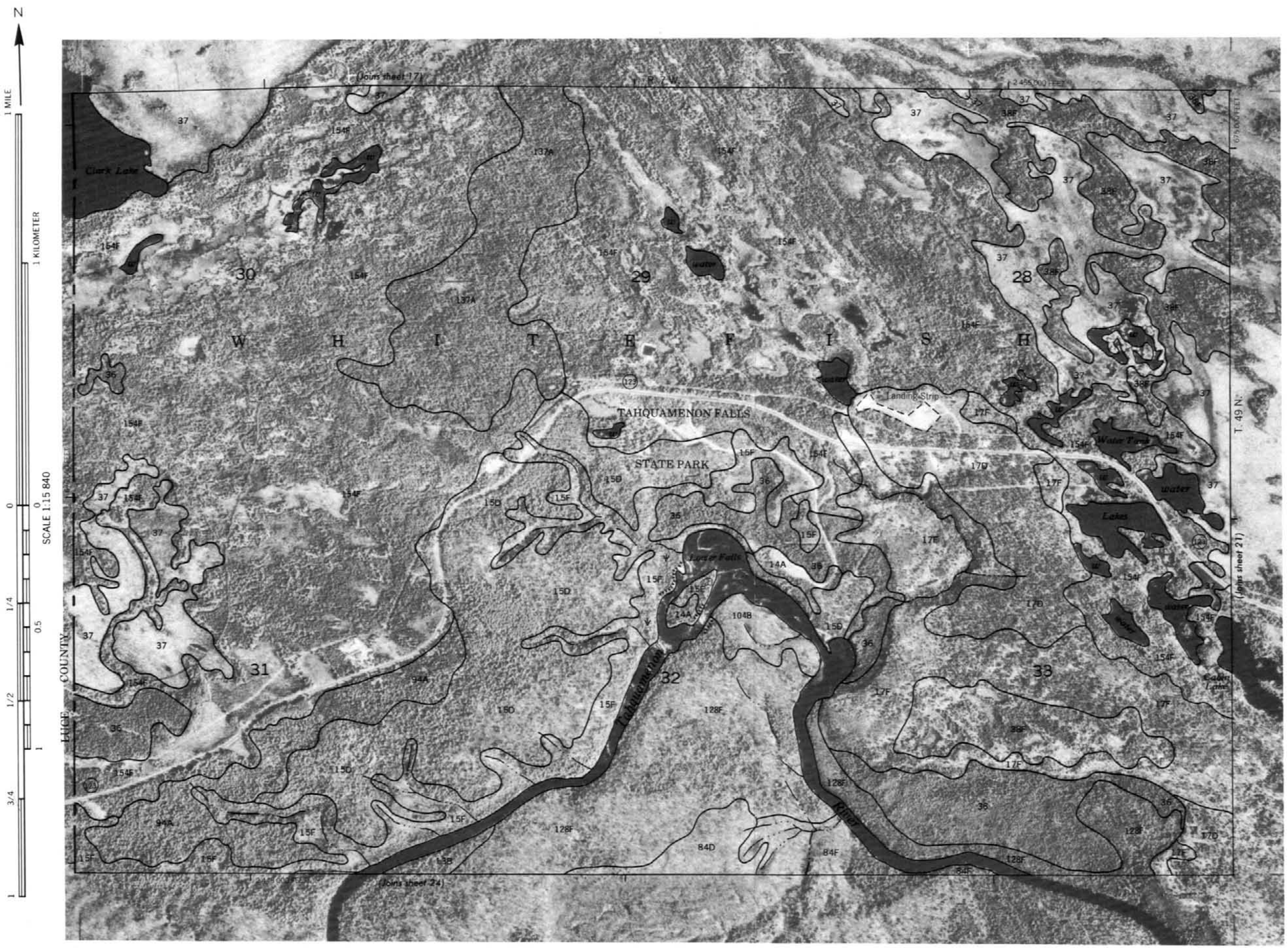
CHIPPEWA COUNTY, MICHIGAN NO. 18

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
R. 6 W.
(Joins sheet 15)
(Joins sheet 22)
(Joins sheet 18)
(Joins inset, sheet 16)
T. 49 N.
W H I T E F I S H
South Branch Betsy River
16
17
18
19
20
21
123
17D
17F
36
38F
87B
15F
16B
21A
137A
33
37
102
water
w
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
SCALE 1:15 840

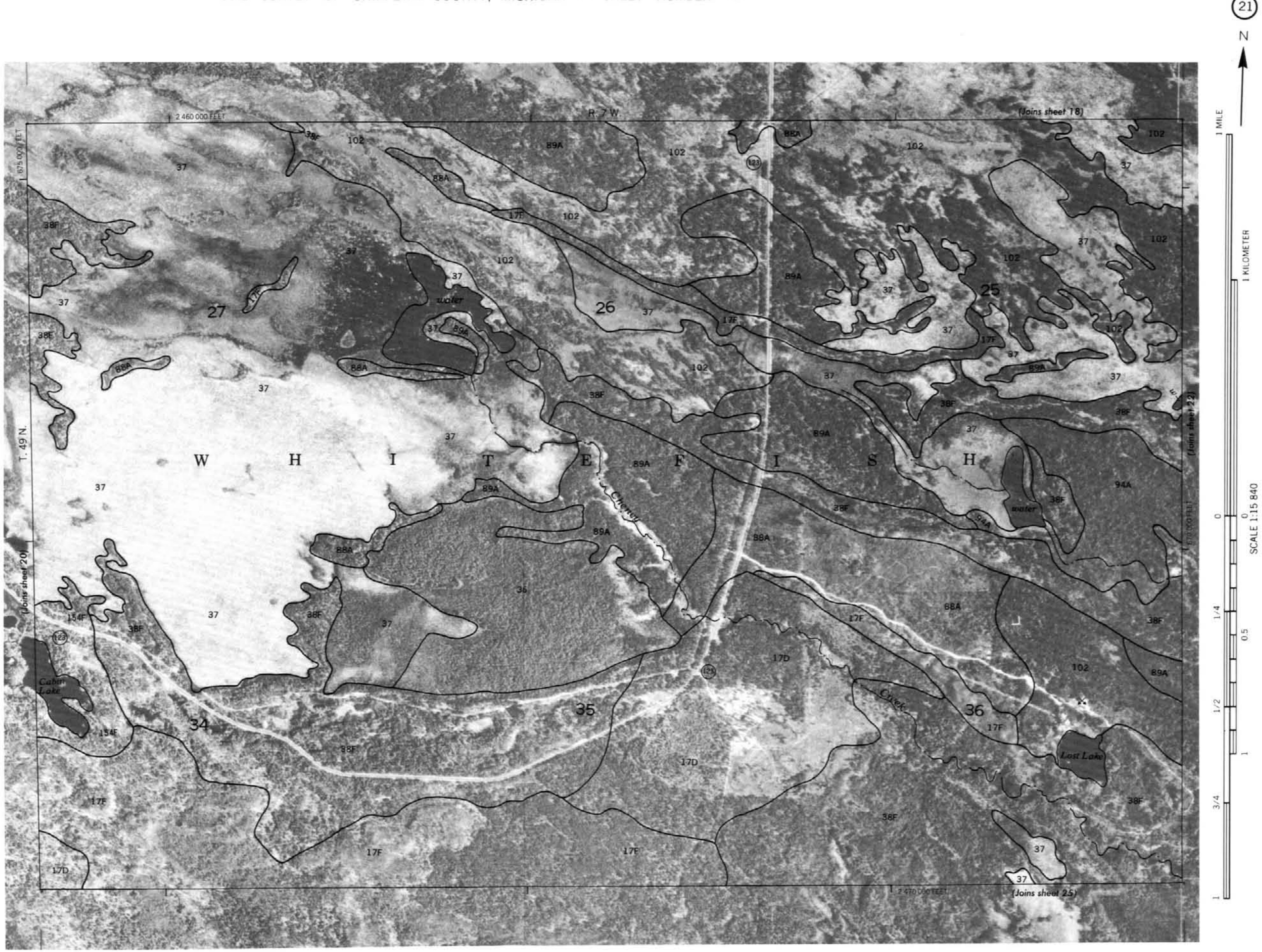
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 20


N
1 MILE
1 KILOMETER
0
0
SCALE 1:15 840
1/4
0.5
1/2
1
3/4
1
(Joins sheet 17)
R. 7 W.
2 450 000 FEET
Clark Lake
30
29
28
31
32
33
W H I T E F I S H
TAHQUAMENON FALLS
STATE PARK
Landing Strip
Lower Falls
Tahquamenon
River
Water Tower
Lakes
water
Cedar Lake
LUCE COUNTY
T. 49 N.
(Joins sheet 21)
(Joins sheet 24)
123
37
154F
137A
38F
36
17F
17D
15F
15D
14A
104B
94A
128F
84D
84F
38B

CHIPPEWA COUNTY, MICHIGAN NO. 20

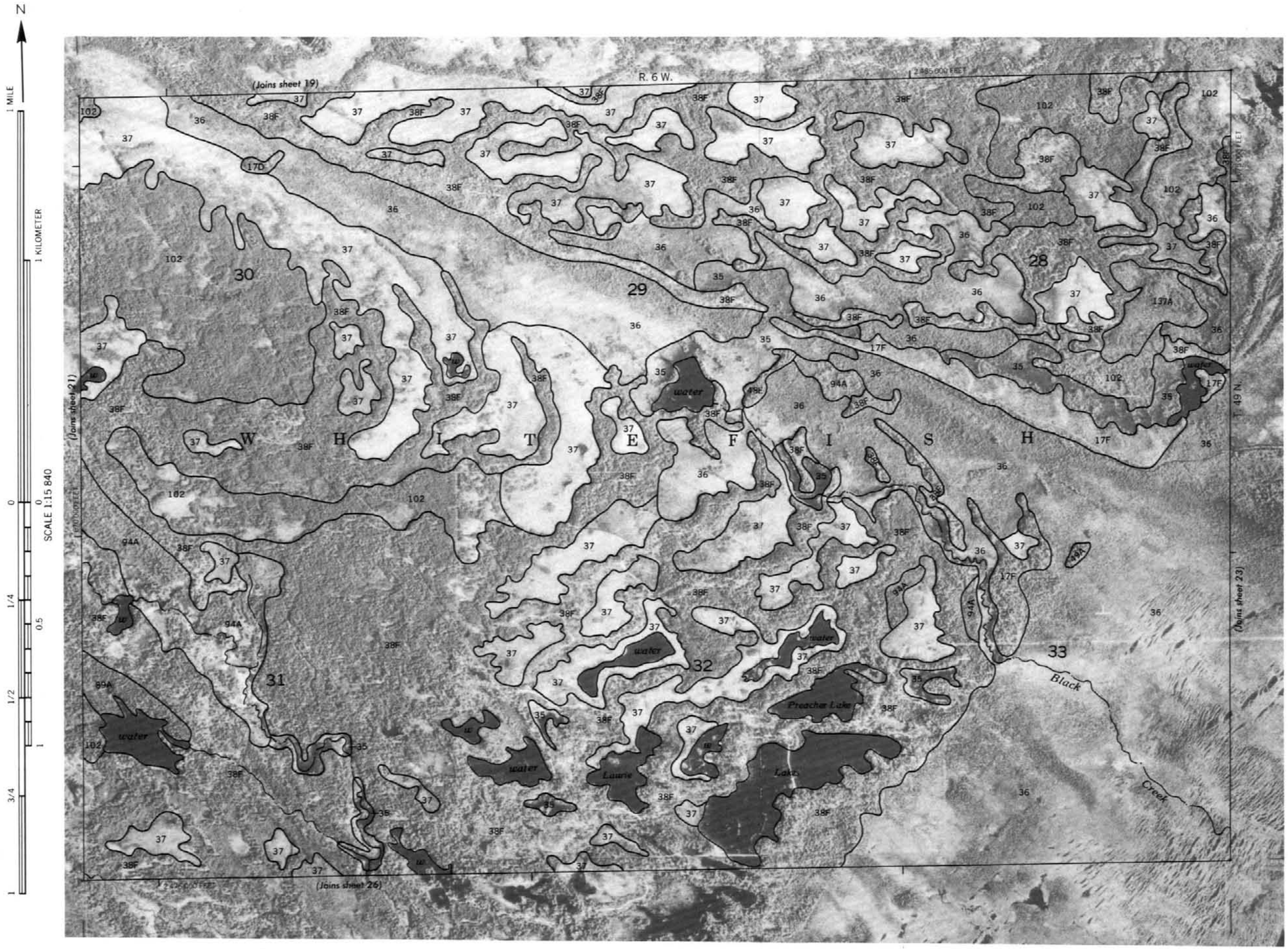
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


21
N
(Joins sheet 18)
(Joins sheet 20)
(Joins sheet 22)
(Joins sheet 25)
R. 7 W.
T. 49 N.
2 460 000 FEET
2 470 000 FEET
875 000 FEET
W H I T E F I S H
25
26
27
34
35
36
water
Cabin Lake
Lost Lake
Chesney Creek
123
17D
17F
36
37
38F
88A
89A
94A
102
154F
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from **1981 - 1983** aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 21

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 22

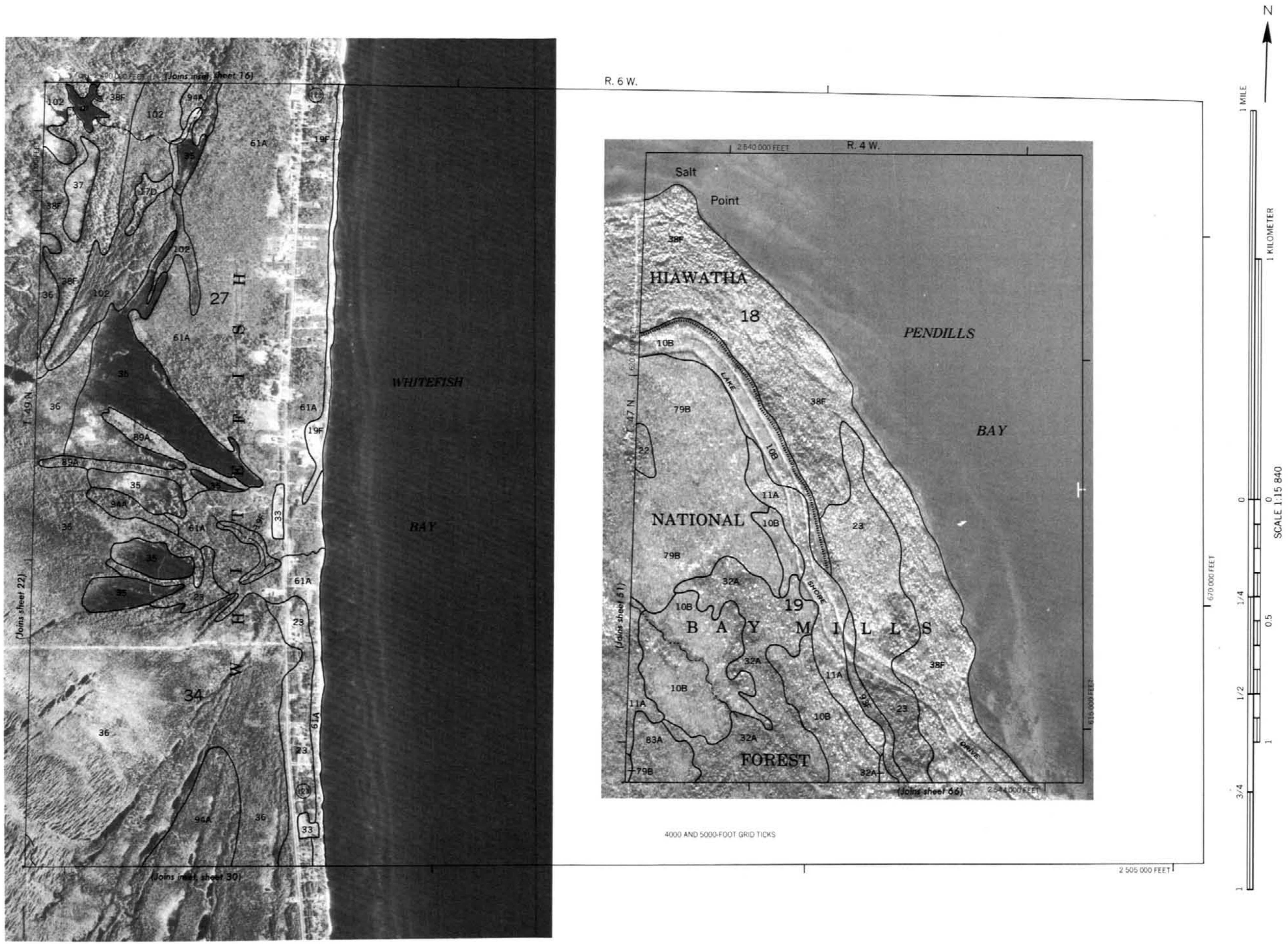

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 19)
(Joins sheet 21)
(Joins sheet 23)
(Joins sheet 26)
R. 6 W.
T. 49 N.
2 485 000 FEET
WHITEFISH
28
29
30
31
32
33
Black Creek
Preacher Lake
Laurie Lake
water
w
17D
17F
35
36
37
38F
94A
102
137A

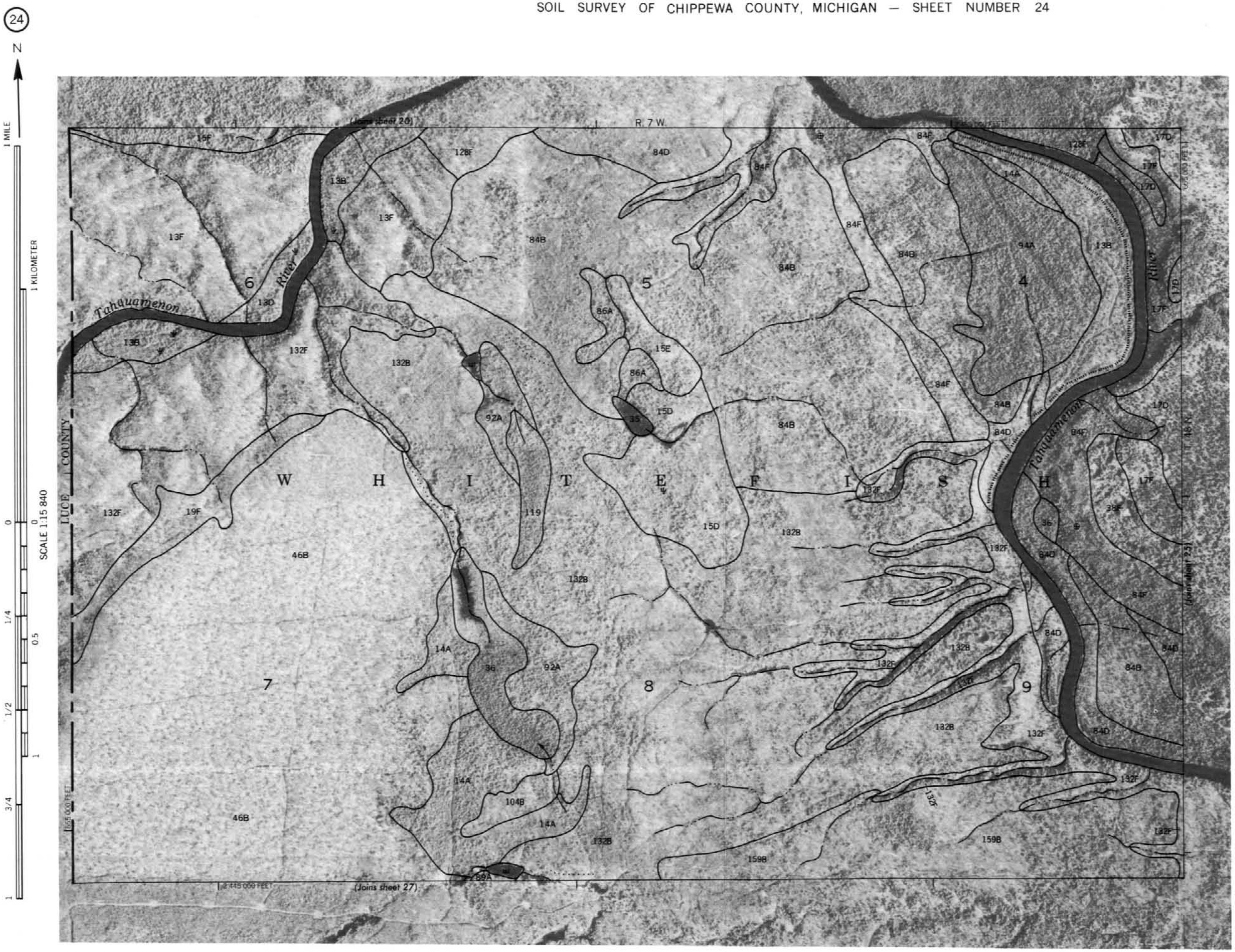
CHIPPEWA COUNTY, MICHIGAN NO. 22

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 23


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
R. 6 W.
R. 4 W.
T. 49 N.
T. 47 N.
(Joins inset, sheet 16)
(Joins sheet 22)
(Joins inset, sheet 30)
(Joins sheet 51)
(Joins sheet 66)
2 640 000 FEET
670 000 FEET
615 000 FEET
620 000 FEET
2 505 000 FEET
4000 AND 5000-FOOT GRID TICKS
WHITEFISH
BAY
PENDILLS
BAY
Salt
Point
HIAWATHA
NATIONAL
FOREST
BAY MILLS
LAKE
SHORE
DRIVE
WHITEFISH
27
34
18
19
102
38F
94A
61A
19F
35
37
17D
36
89A
33
23
11A
10B
79B
22
32A
83A

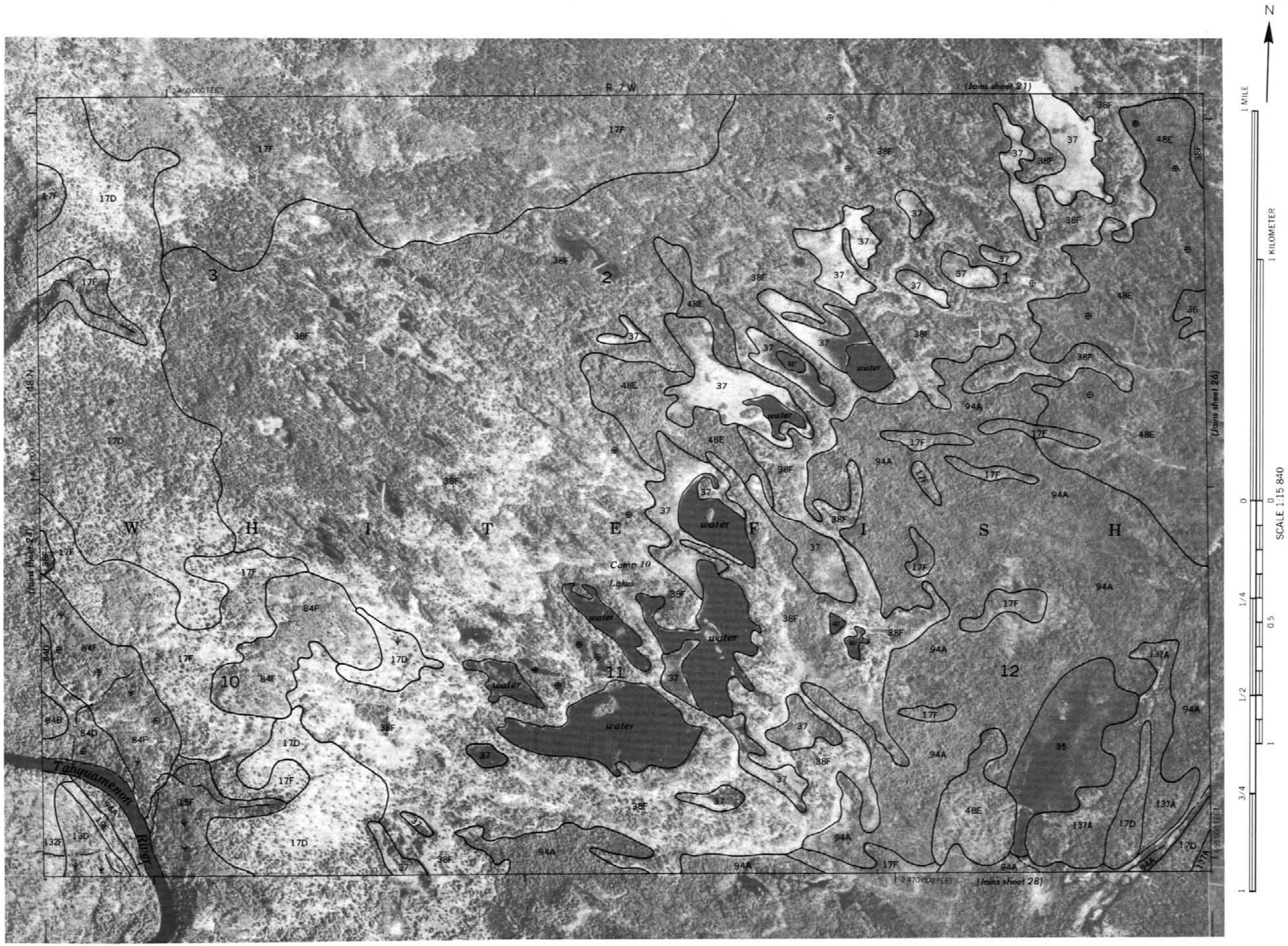

24
N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840
LUCE COUNTY
R. 7 W.
(Joins sheet 20)
(Joins sheet 27)
(Joins sheet 23)
T. 48 N.
2 445 000 FEET
555 000 FEET
Tahquamenon River
W H I T E F I S H
6
5
4
7
8
9
15F
13B
128F
84D
84F
13F
84B
94A
14A
17D
17F
13D
132F
132B
86A
15E
15D
35
92A
119
19F
46B
36
14A
104B
89A
159B
36F
84D

CHIPPEWA COUNTY, MICHIGAN NO. 24

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

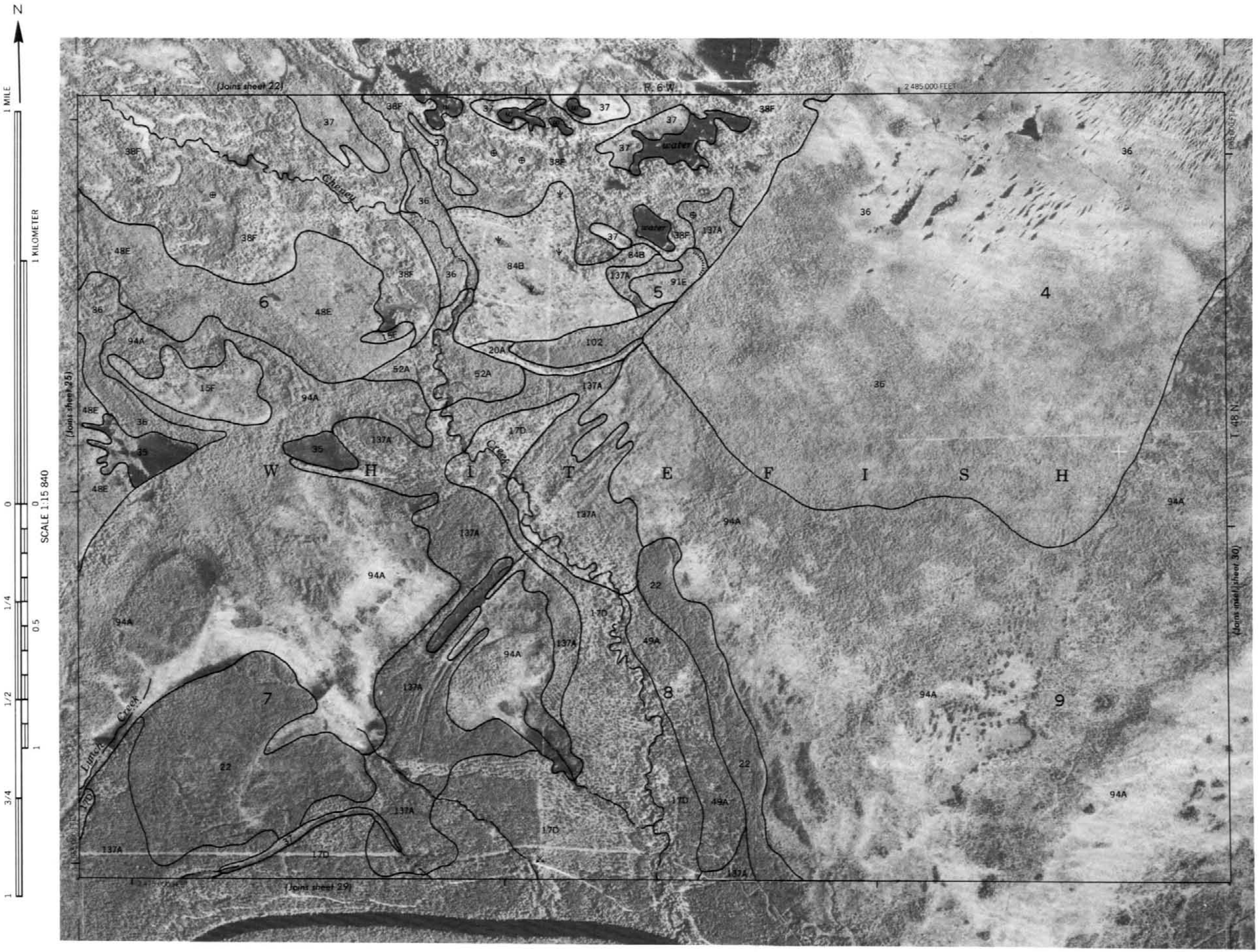
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 25



N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
2 460 000 FEET
R. 7 W.
(Joins sheet 21)
(Joins sheet 26)
(Joins sheet 28)
(Joins sheet 24)
2 470 000 FEET
T. 48 N.
W H I T E F I S H
3
2
1
10
11
12
Camp 10 Lakes
Tahquamenon River
water
w
17F
17D
38F
37
48E
36
94A
84F
84D
84B
17D
13D
13F
132F
15F
35
137A

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 26


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 22)
R. 6 W.
2 485 000 FEET
(Joins sheet 25)
(Joins inset, sheet 30)
(Joins sheet 29)
T. 48 N.
W H I T E F I S H
Cheney
Creek
Lunch Creek
water
4
5
6
7
8
9
15F
17D
20A
22
35
36
37
38F
48E
49A
52A
84B
91E
94A
102
137A

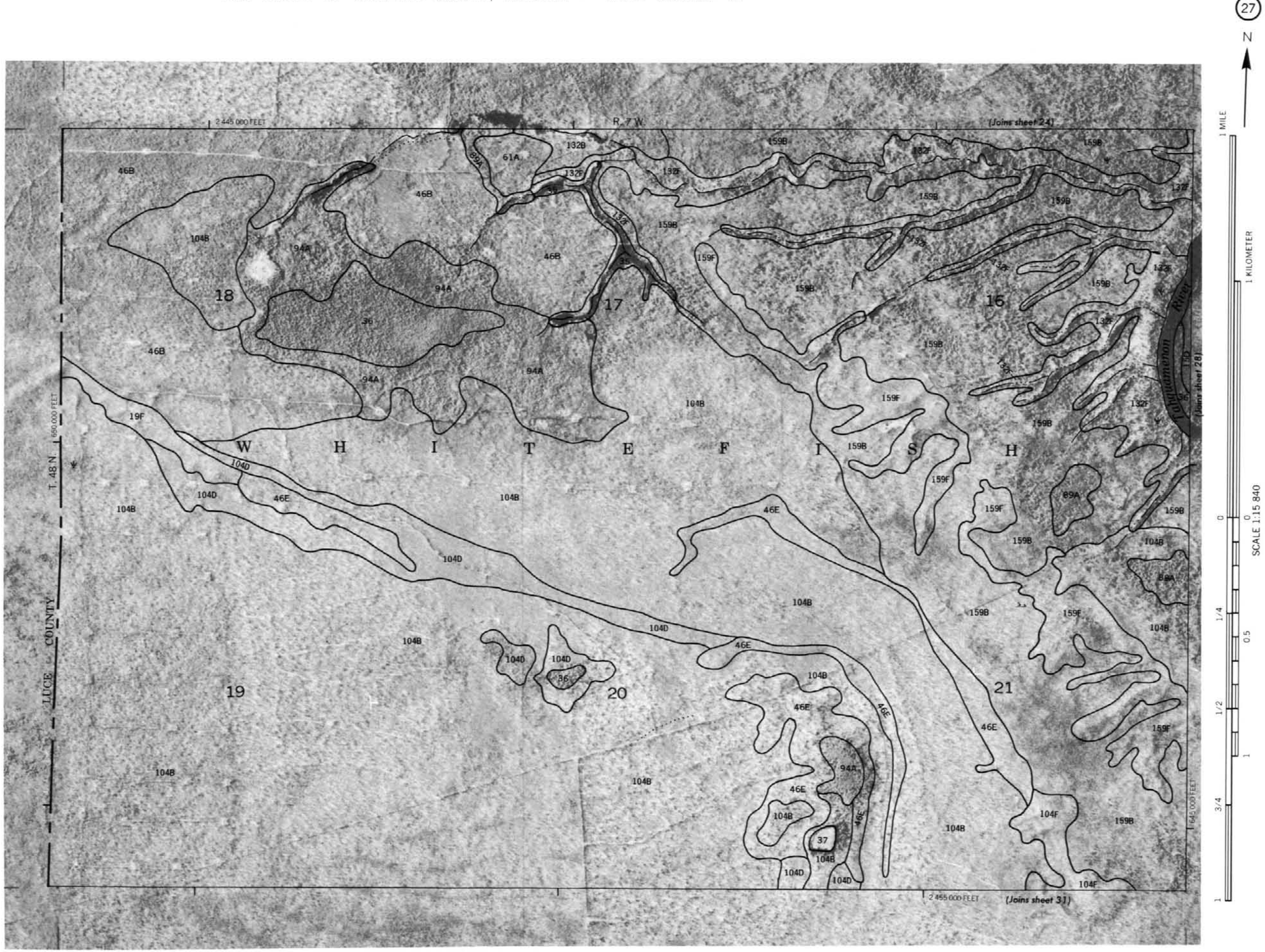
CHIPPEWA COUNTY, MICHIGAN NO. 26

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

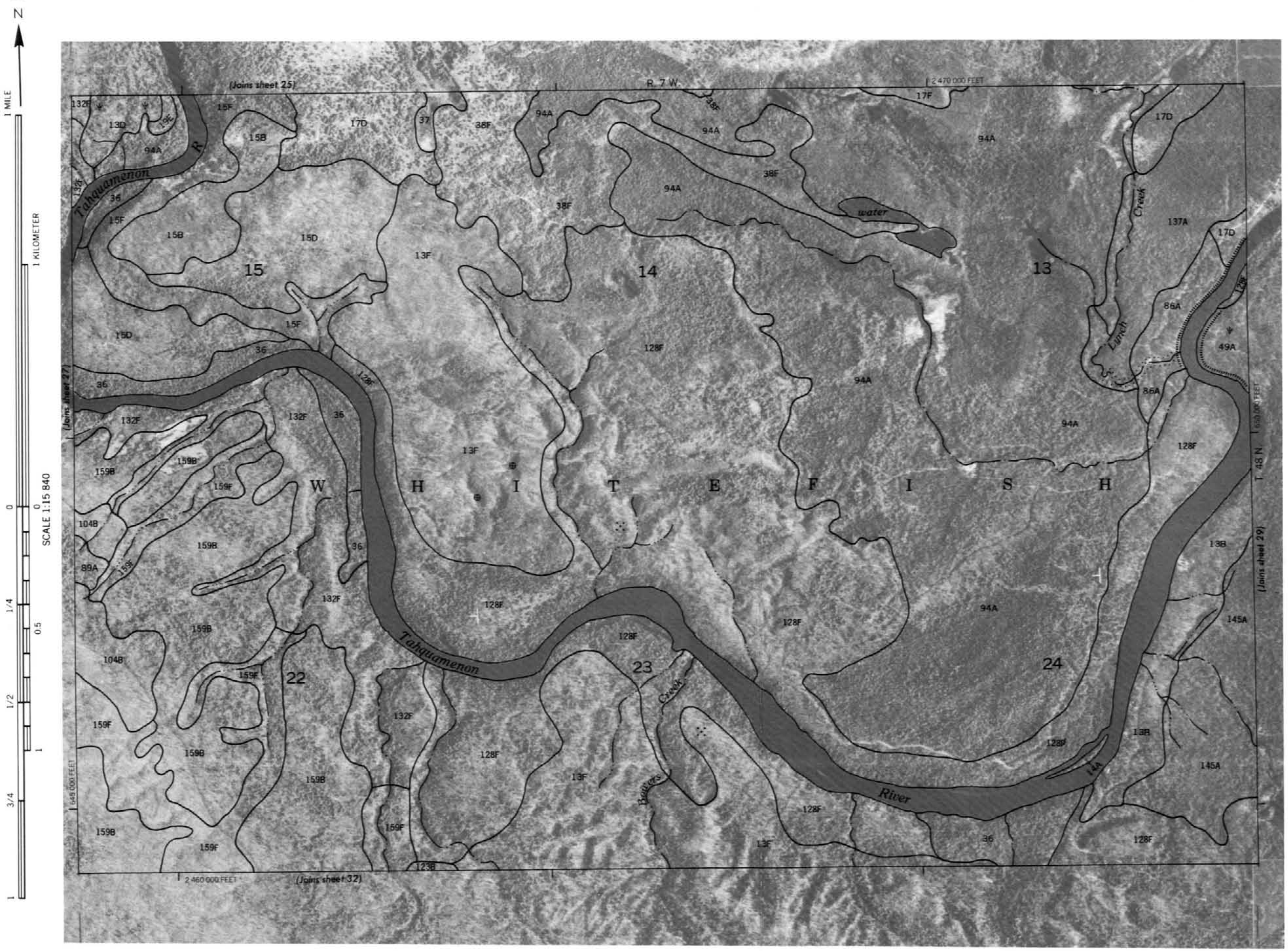
SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 27

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 27


27
N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
2 445 000 FEET
R. 7 W.
(Joins sheet 24)
(Joins sheet 28)
(Joins sheet 31)
2 455 000 FEET
650 000 FEET
645 000 FEET
T. 48 N.
LUCE COUNTY
W H I T E F I S H
Tahquamenon River
18
17
16
19
20
21
46B
104B
94A
36
61A
89A
132B
132F
159B
159F
19F
104D
46E
104F
37

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 28


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 25)
(Joins sheet 27)
(Joins sheet 29)
(Joins sheet 32)
R. 7 W.
T. 48 N.
2 470 000 FEET
2 460 000 FEET
645 000 FEET
650 000 FEET
Tahquamenon R.
Tahquamenon River
Lynch Creek
Bowers Creek
water
W H I T E F I S H
15
14
13
22
23
24
132F
13D
13E
94A
15F
15B
17D
37
38F
17F
36
15D
13F
128F
137A
86A
49A
132F
159B
159F
104B
89A
13B
145A
14A
123B

CHIPPEWA COUNTY, MICHIGAN NO. 28

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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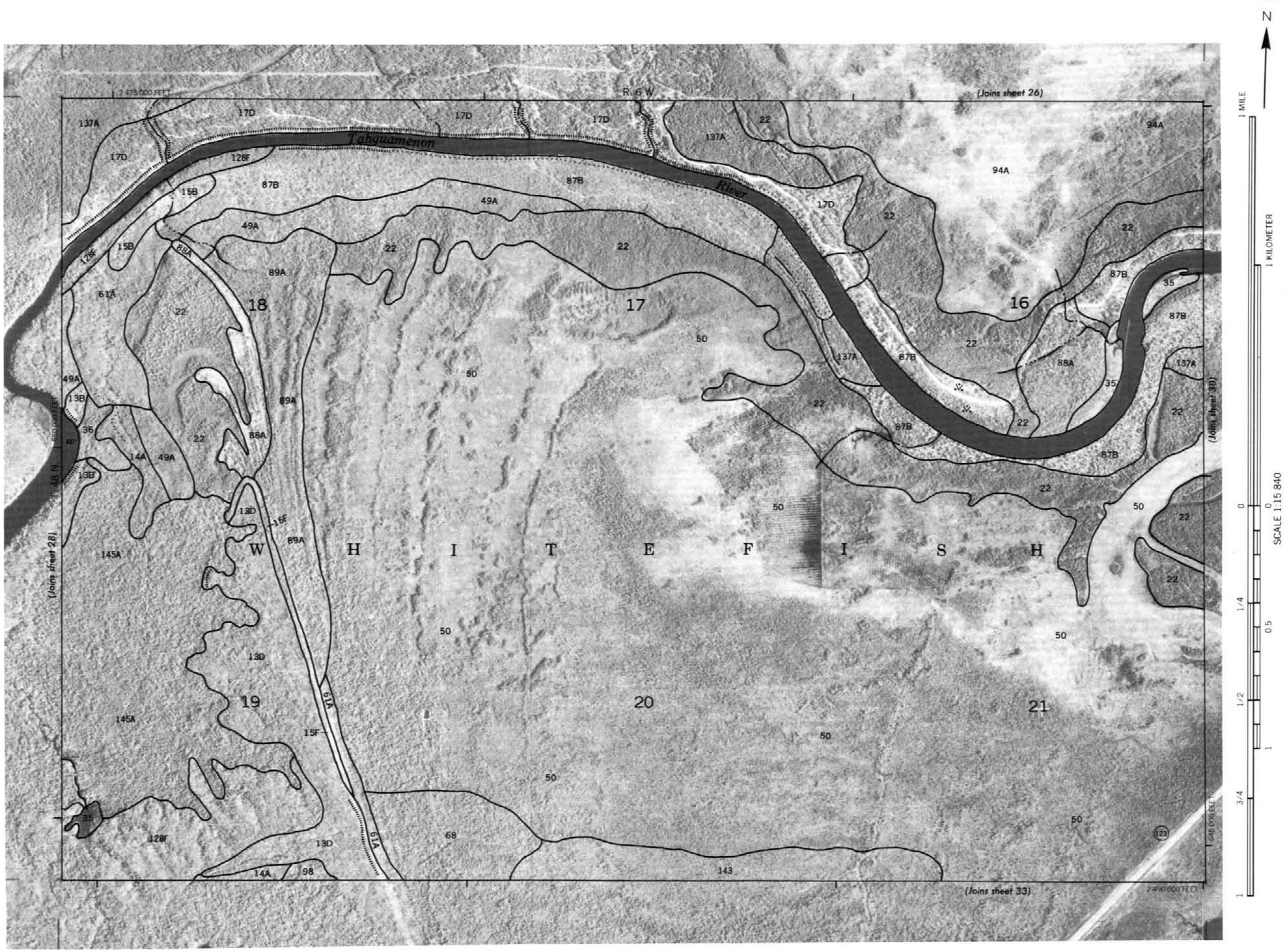
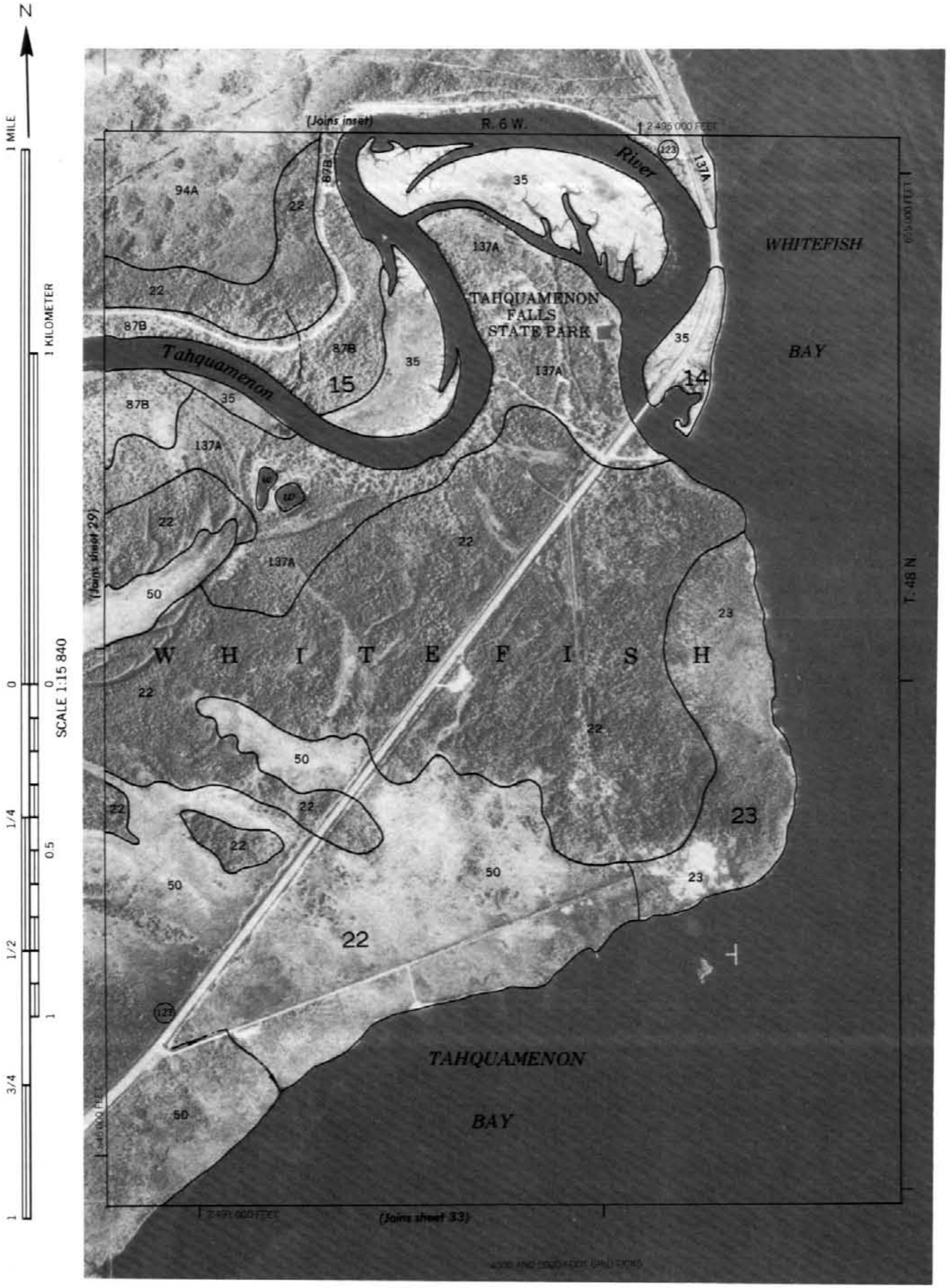
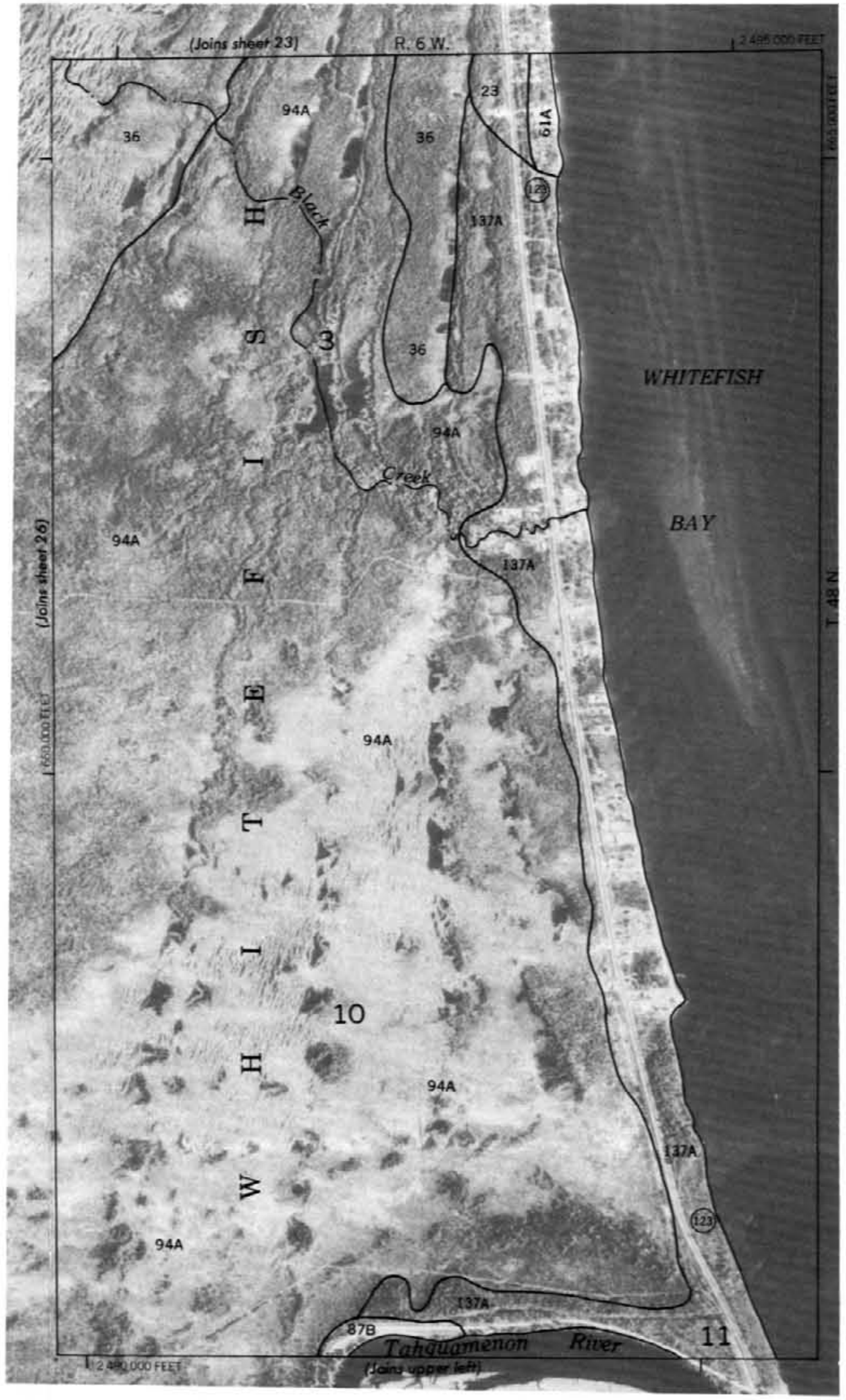
CHIPPEWA COUNTY, MICHIGAN NO. 29


29
N
Tahquamenon River
R. 6 W.
T. 48 N.
2 475 000 FEET
2 490 000 FEET
(Joins sheet 26)
(Joins sheet 28)
(Joins sheet 30)
(Joins sheet 33)
W H I T E F I S H
16
17
18
19
20
21
123
137A
17D
128F
87B
15B
49A
88A
89A
22
61A
13B
36
14A
145A
13D
15F
35
68
98
143
50
94A
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 30


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins inset)
R. 6 W.
2 490 000 FEET
655 000 FEET
T. 48 N
(Joins sheet 29)
(Joins sheet 33)
2 480 000 FEET
645 000 FEET
5000 AND 10000-FOOT GRID TICKS
123
River
Tahquamenon
TAHQUAMENON FALLS STATE PARK
WHITEFISH BAY
TAHQUAMENON BAY
W H I T E F I S H
15
14
23
22
94A
22
87B
35
137A
87B
35
14
137A
50
w
23
22
50
22
50
23


(Joins sheet 23)
R. 6 W.
2 495 000 FEET
655 000 FEET
650 000 FEET
T. 48 N
(Joins sheet 26)
(Joins upper left)
2 490 000 FEET
123
Black Creek
WHITEFISH BAY
W H I T E F I S H
3
10
11
36
94A
23
61A
137A
137A
94A
87B
Tahquamenon River

CHIPPEWA COUNTY, MICHIGAN NO. 30

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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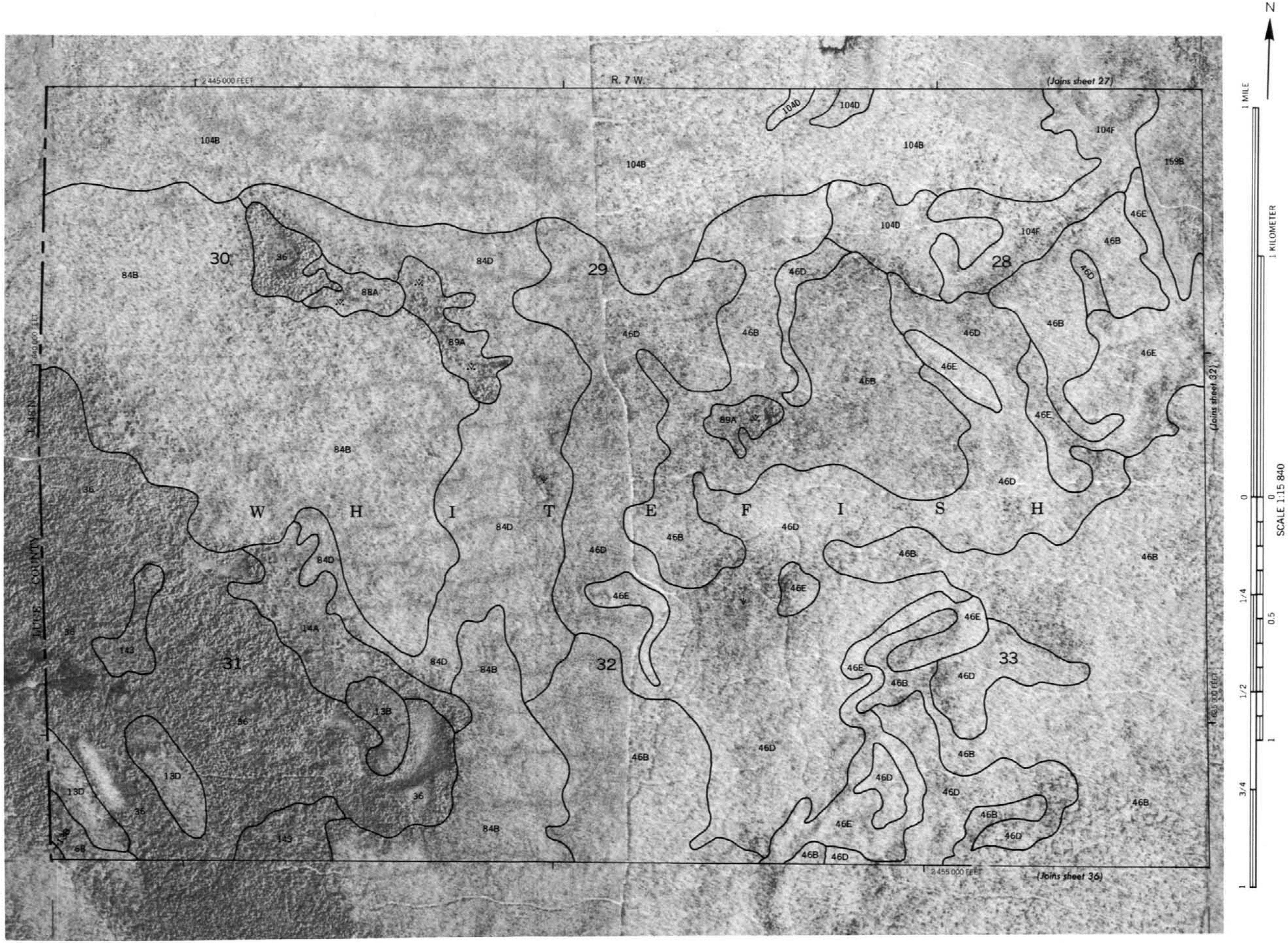
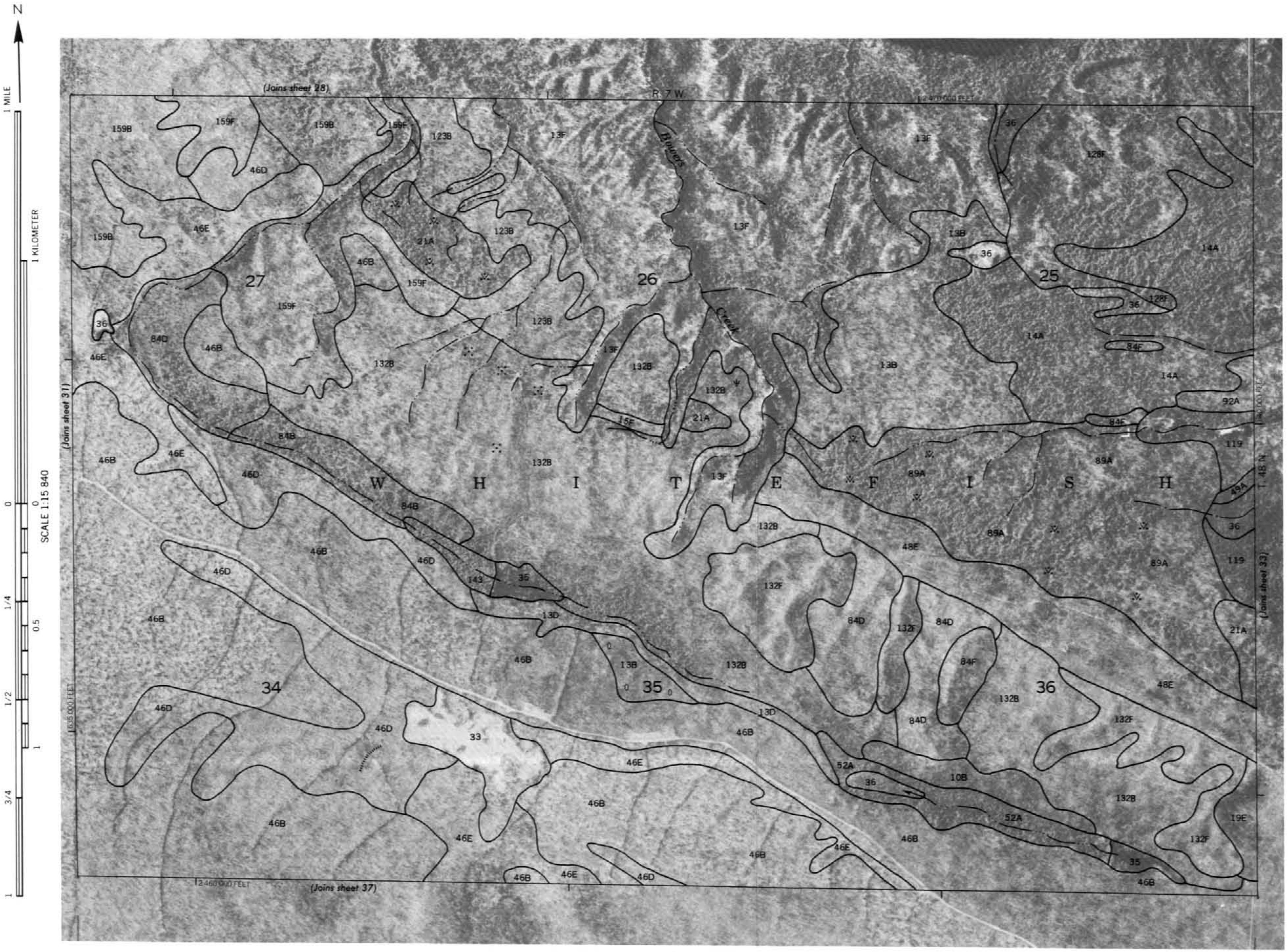
CHIPPEWA COUNTY, MICHIGAN NO. 31


N
2 445 000 FEET
R. 7 W.
(Joins sheet 27)
104D
104D
104B
104B
104B
104F
159B
104D
104F
46E
46B
28
46D
30
36
84B
88A
84D
29
46D
46B
46D
46B
89A
46E
46D
46B
46E
46E
640 000 FEET
T. 48 N.
(Joins sheet 32)
84B
89A
36
46D
W
H
I
T
E
F
I
S
H
84D
46D
46B
46D
46B
46B
84D
46E
46E
LUCE COUNTY
36
143
31
14A
84D
84B
32
46E
46B
46E
33
46D
13B
36
46D
46B
46B
13D
13D
36
36
84B
46D
46D
46E
46D
46B
46D
143
13B
6B
46B
46D
2 455 000 FEET
(Joins sheet 36)
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
SCALE 1:15 840

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 32


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
(Joins sheet 28)
(Joins sheet 31)
(Joins sheet 33)
(Joins sheet 37)
R. 7 W.
T. 48 N.
W H I T E F I S H
Rogers Creek
25
26
27
33
34
35
36
159B
159F
46D
46E
46B
123B
13F
13B
13D
128F
14A
21A
36
84D
84B
84F
132B
132F
15F
89A
92A
119
49A
48E
143
35
21A
10B
52A
19E
33

CHIPPEWA COUNTY, MICHIGAN NO. 32

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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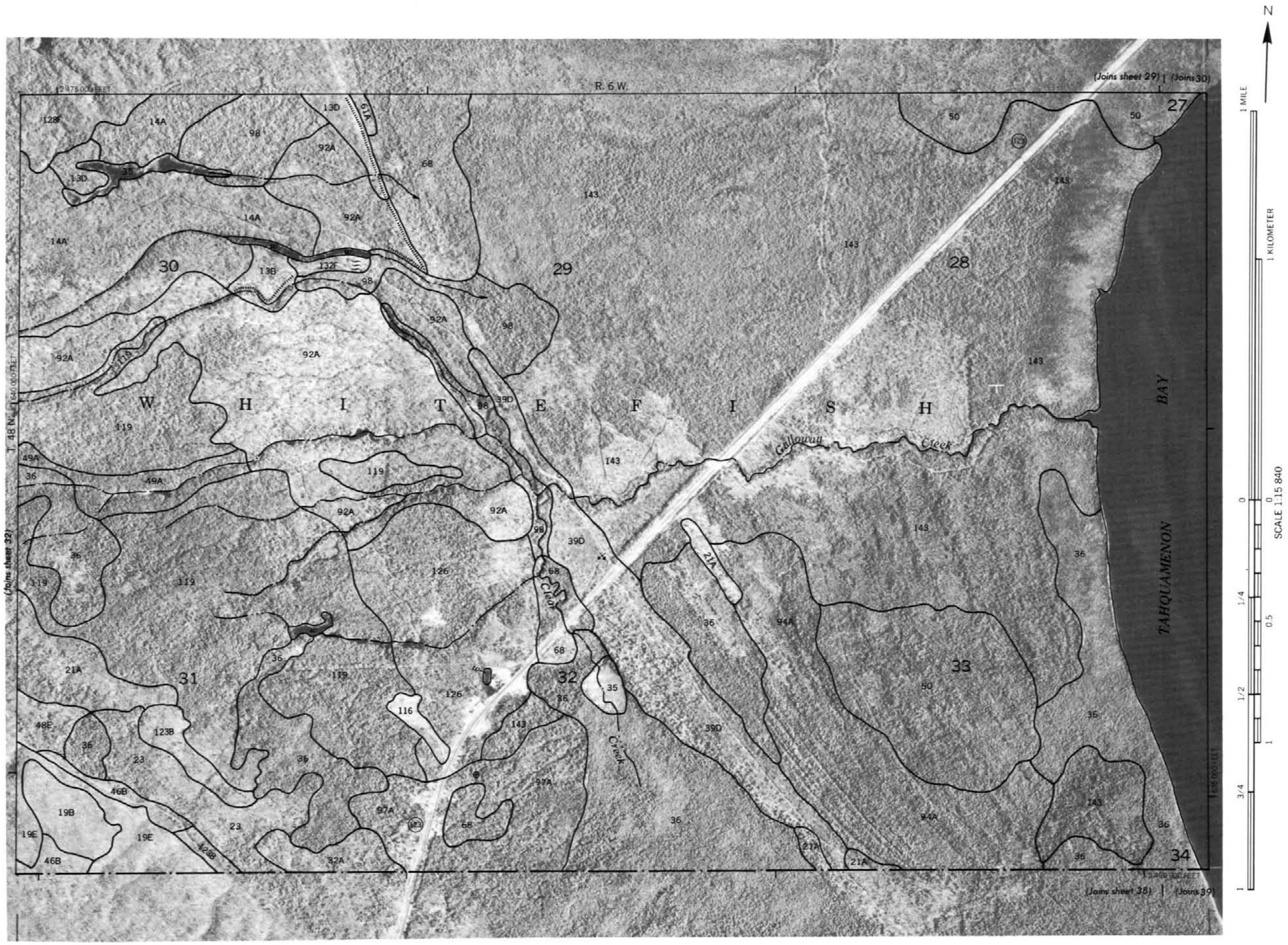
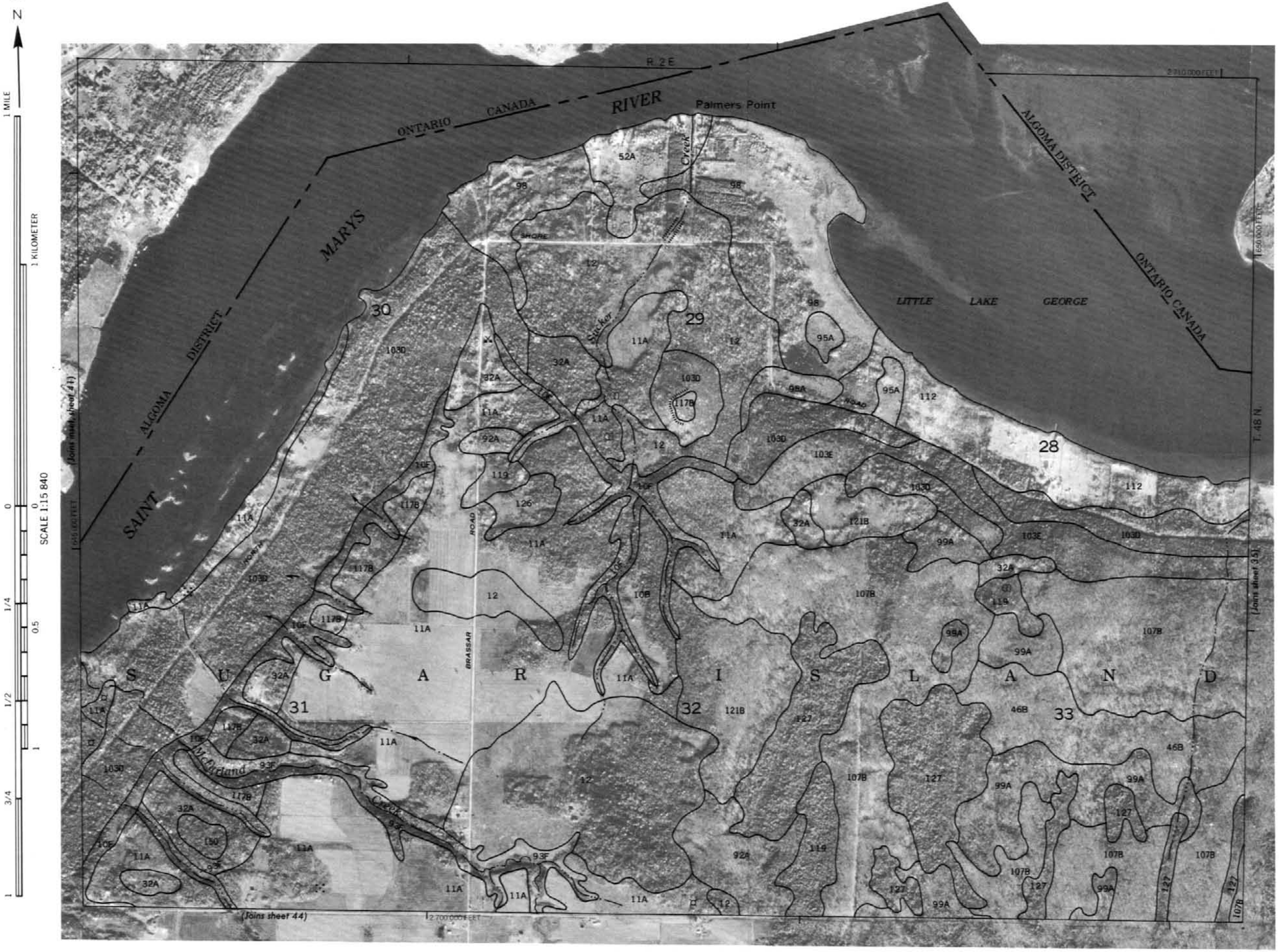
CHIPPEWA COUNTY, MICHIGAN NO. 33


N
R. 6 W.
T. 48 N.
2 475 000 FEET
(Joins sheet 29)
(Joins 30)
(Joins sheet 32)
(Joins sheet 38)
(Joins 39)
WHITEFISH
Galloway Creek
Clear Creek
TAHQUAMENON BAY
27
28
29
30
31
32
33
34
128F
14A
13D
98
92A
61A
68
35
143
50
123
132F
13B
30
119
92A
39D
49A
36
126
116
21A
94A
48E
123B
23
46B
19B
19E
97A
32A
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 34


N
1 MILE
1 KILOMETER
0
1/4
0.5
1/2
3/4
1
SCALE 1:15 840
R. 2 E.
ONTARIO CANADA
RIVER
SAINT MARYS
ALGOMA DISTRICT
Palmers Point
Creek
ALGOMA DISTRICT
ONTARIO CANADA
LITTLE LAKE GEORGE
Sucker
SHORE
ROAD
BRASSAR ROAD
McFarland Creek
S U G A R I S L A N D
T. 48 N.
(Joins inset, sheet 41)
(Joins sheet 35)
(Joins sheet 44)
2 710 000 FEET
2 700 000 FEET
650 000 FEET
645 000 FEET
28
29
30
31
32
33
52A
98
12
11A
32A
92A
10F
117B
119
126
103D
103E
95A
112
121B
99A
107B
46B
127
93F
13D
10B

CHIPPEWA COUNTY, MICHIGAN NO. 34

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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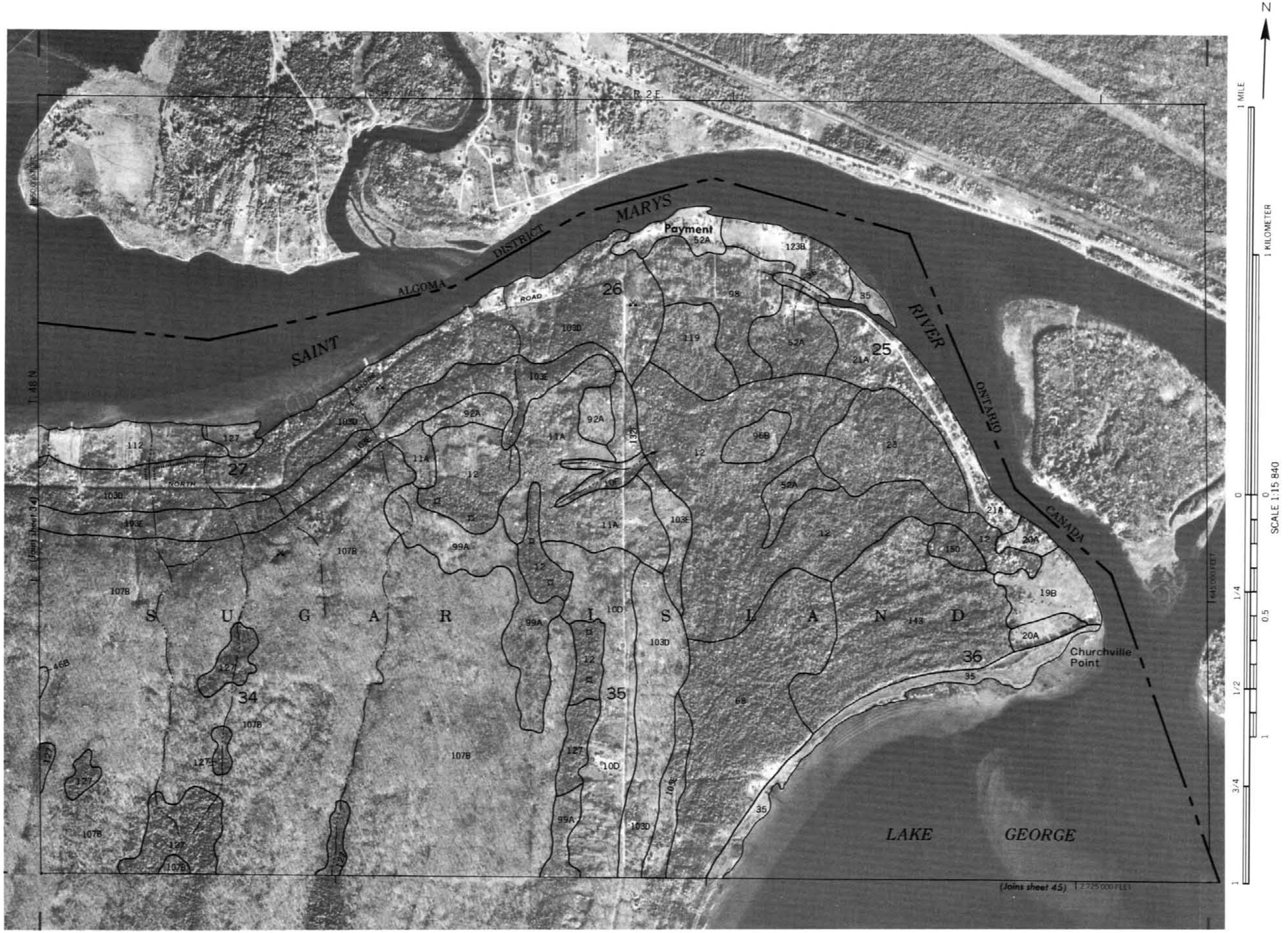
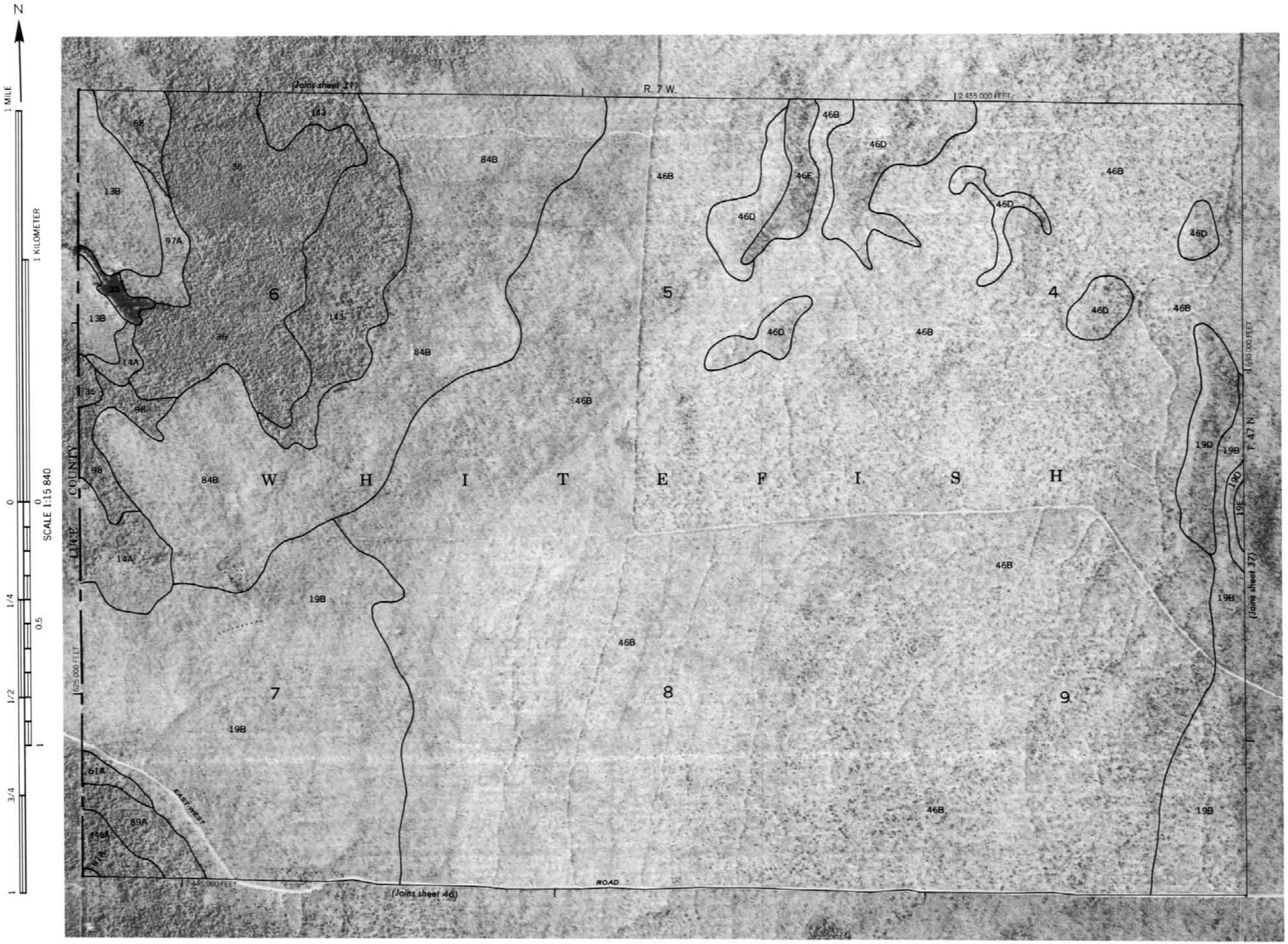
CHIPPEWA COUNTY, MICHIGAN NO. 35


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
R. 2 E.
T. 48 N.
(Joins sheet 34)
(Joins sheet 45)
2 725 000 FEET
645 000 FEET
SAINT MARYS RIVER
ALGOMA DISTRICT
ONTARIO
CANADA
SUGAR ISLAND
LAKE GEORGE
Payment
Churchville Point
ROAD
NORTH
26
25
27
34
35
36
52A
123B
98
35
103D
119
52A
21A
103E
92A
11A
12
96B
23
127
112
103D
103E
11A
10F
52A
12
21A
20A
150
103E
107B
99A
11A
12
10D
19B
143
20A
46B
127
107B
99A
103D
68
127
107B
127
10D
127
99A
103D
35
107B
127

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 36


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 27)
R. 7 W.
2 455 000 FEET
630 000 FEET
T. 47 N.
(Joins sheet 37)
(Joins sheet 46)
ROAD
2 445 000 FEET
625 000 FEET
EAST-WEST
LUCE COUNTY
W H I T E F I S H
4
5
6
7
8
9
56
143
36
13B
97A
35
13B
36
143
14A
36
98
98
84B
14A
84B
84B
84B
19B
19B
46B
46B
46B
46B
46B
46B
46B
46B
46B
46D
46D
46D
46D
46D
46D
46D
46E
19D
19B
19D
19E
19B
19B
61A
89A
846A
87A

CHIPPEWA COUNTY, MICHIGAN NO. 36

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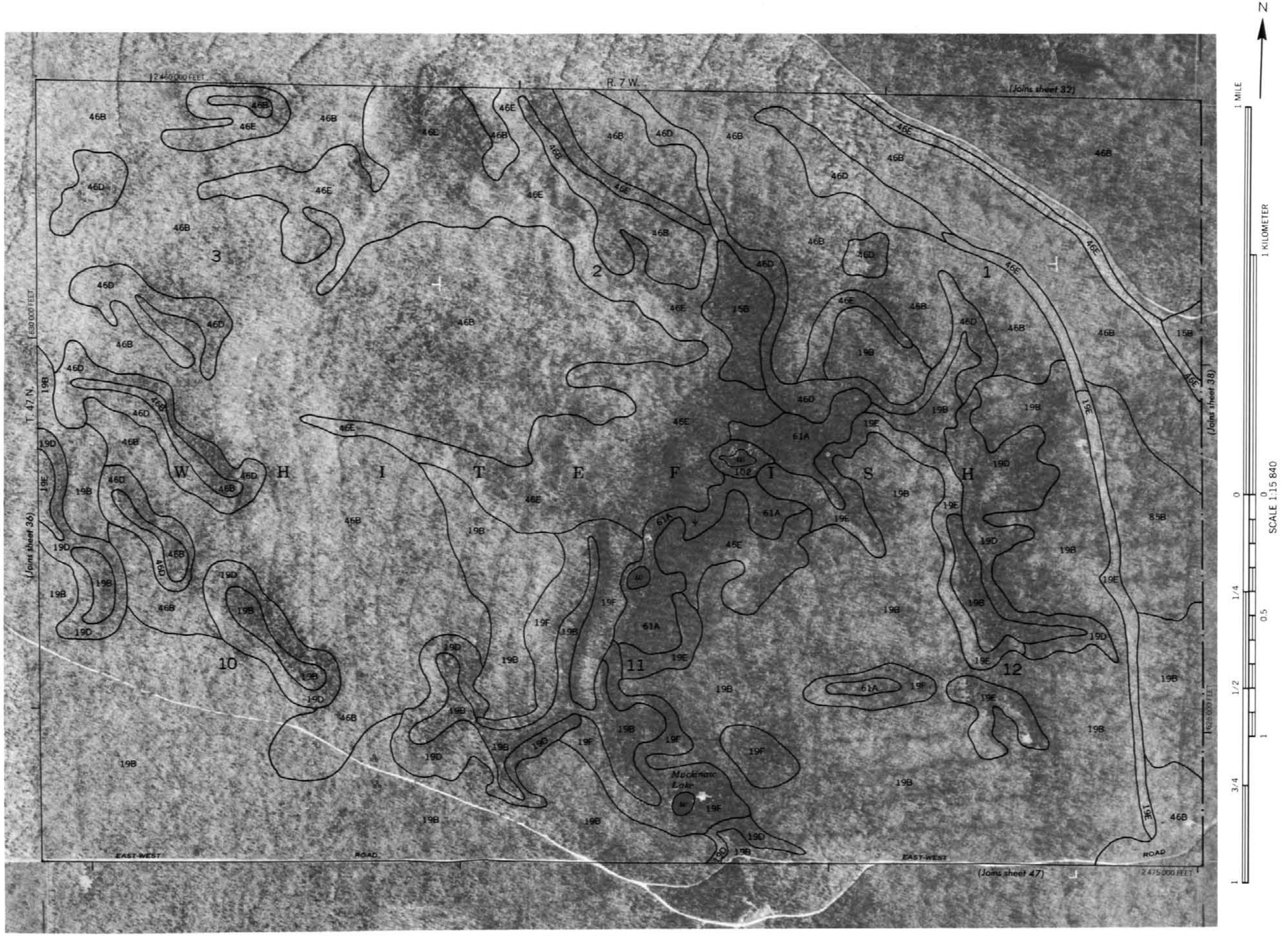
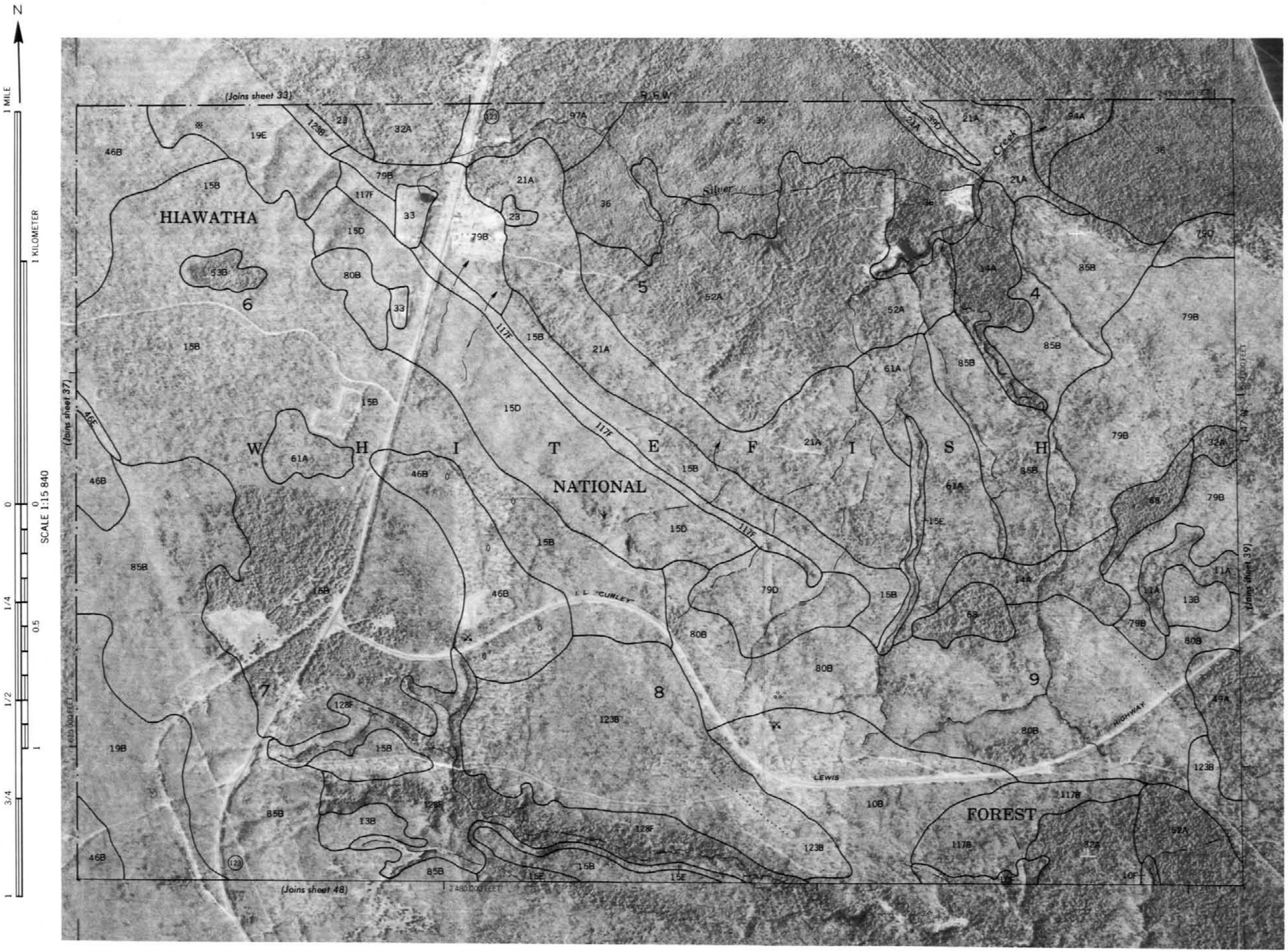
CHIPPEWA COUNTY, MICHIGAN NO. 37


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
2 460 000 FEET
R. 7 W.
(Joins sheet 32)
T. 47 N.
630 000 FEET
(Joins sheet 36)
(Joins sheet 38)
625 000 FEET
(Joins sheet 47)
2 475 000 FEET
EAST-WEST
ROAD
EAST-WEST
ROAD
W H I T E F I S H
Mackinac Lake
1
2
3
10
11
12
46B
46D
46E
19B
19D
19E
19F
15B
61A
102
85B
w

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 38


N
1 MILE
1 KILOMETER
0
SCALE 1:15 840
1/4
0.5
1/2
1
3/4
1
(Joins sheet 33)
R. 5 W.
(Joins sheet 37)
(Joins sheet 39)
(Joins sheet 48)
2 480 000 FEET
480 000 FEET
HIAWATHA
W H I T E F I S H
NATIONAL
FOREST
Silver Creek
L. L. "CURLEY" LEWIS HIGHWAY
123
T. 47 N.
4
5
6
7
8
9
46B
19E
23
123B
32A
97A
36
21A
39D
94A
15B
79B
117F
33
15D
53B
80B
21A
52A
14A
85B
75D
79B
61A
46B
15E
68
32A
11A
13B
79D
10B
117B
128F
19B
85B
13B
15E
49A
82A
10F

CHIPPEWA COUNTY, MICHIGAN NO. 38

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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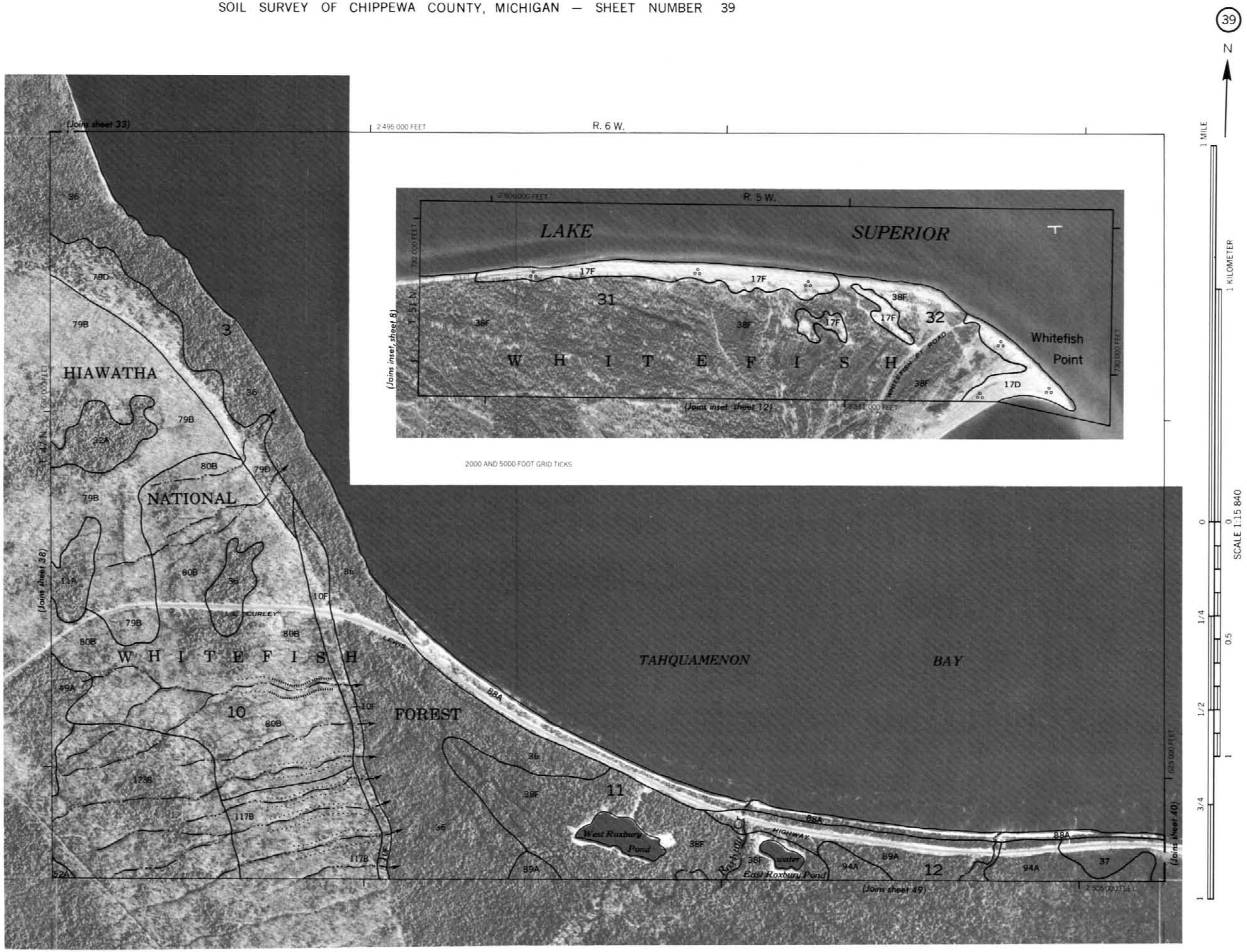
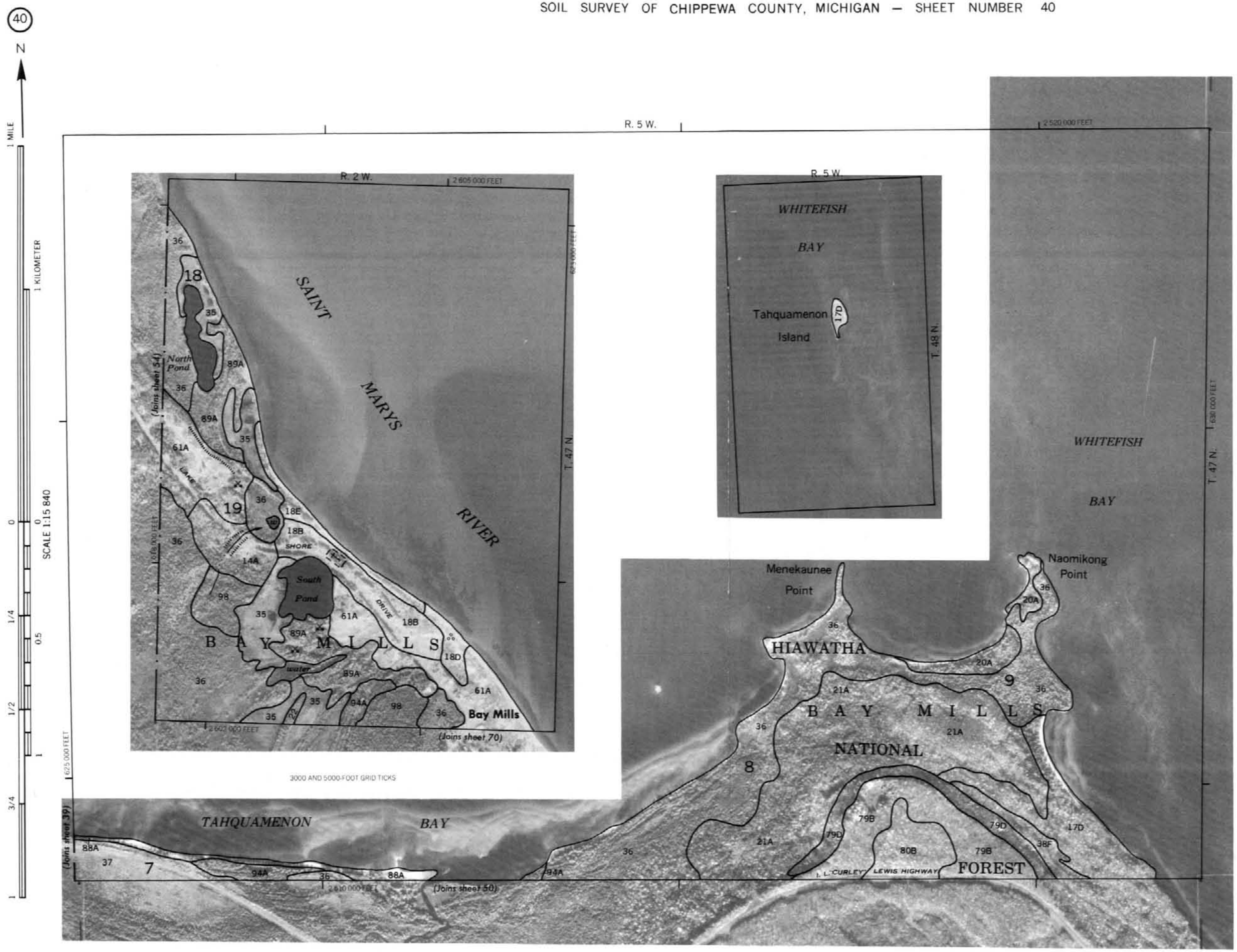
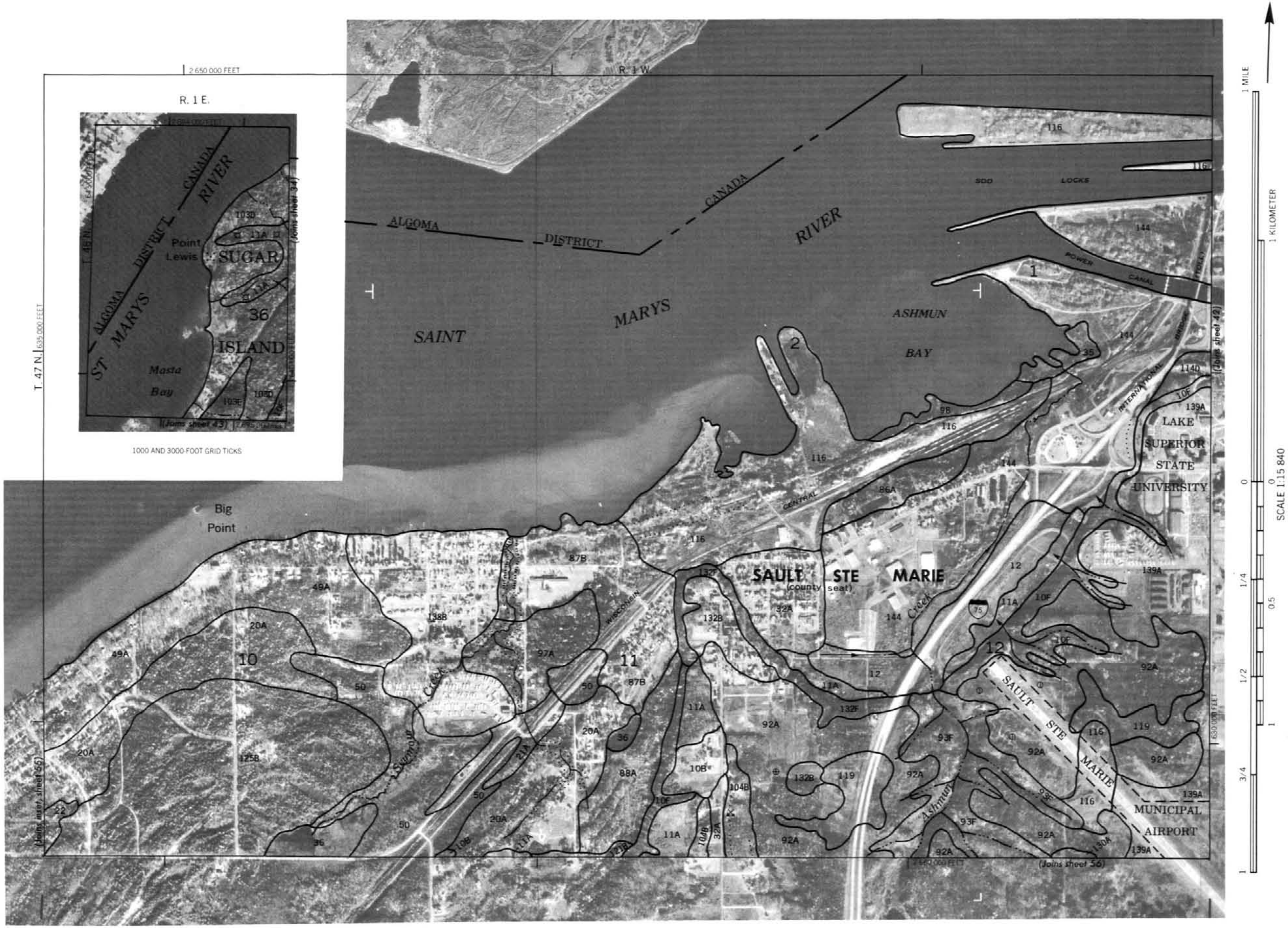
CHIPPEWA COUNTY, MICHIGAN NO. 39


39
N
(Joins sheet 33)
2 495 000 FEET
R. 6 W.
T. 47 N.
(Joins sheet 38)
HIAWATHA
NATIONAL
W H I T E F I S H
FOREST
CURLEY
LEWIS
HIGHWAY
36
79D
79B
3
32A
80B
11A
49A
10
10F
123B
117B
88A
38F
11
89A
94A
12
37
West Roxbury Pond
East Roxbury Pond
water
Roxbury Cr.
TAHQUAMENON
BAY
(Joins sheet 49)
(Joins sheet 40)
2 505 000 FEET
R. 5 W.
T. 51 N.
LAKE
SUPERIOR
17F
31
32
17D
Whitefish
Point
WHITEFISH PT. ROAD
(Joins inset, sheet 8)
(Joins inset, sheet 12)
2000 AND 5000 FOOT GRID TICKS
1 MILE
1/4
1/2
3/4
0
1 KILOMETER
0.5
SCALE 1:15 840


40
N
1 MILE
1 KILOMETER
0
SCALE 1:15 840
1/4
0.5
1/2
3/4
1
R. 5 W.
R. 2 W.
2 605 000 FEET
625 000 FEET
SAINT
MARYS
RIVER
T. 47 N.
36
18
35
North Pond
89A
(Joins sheet 54)
36
89A
35
61A
LAKE
36
19
18E
18B
SHORE
36
14A
South Pond
98
35
61A
DRIVE
18B
89A
water
89A
18D
61A
B A Y M I L L S
36
35
94A
98
35
36
Bay Mills
2 602 000 FEET
(Joins sheet 70)
625 000 FEET
3000 AND 5000-FOOT GRID TICKS
R. 5 W.
WHITEFISH
BAY
Tahquamenon Island
17D
T. 48 N.
2 520 000 FEET
630 000 FEET
WHITEFISH
BAY
T. 47 N.
Menekaunee Point
Naomikong Point
36
20A
36
HIAWATHA
20A
9
36
21A
B A Y M I L L S
36
21A
NATIONAL
8
79B
79D
79D
21A
80B
79B
38F
17D
FOREST
L. CURLEY LEWIS HIGHWAY
TAHQUAMENON
BAY
(Joins sheet 39)
88A
37
7
94A
36
88A
2 610 000 FEET
(Joins sheet 50)
94A
36

CHIPPEWA COUNTY, MICHIGAN NO. 40

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

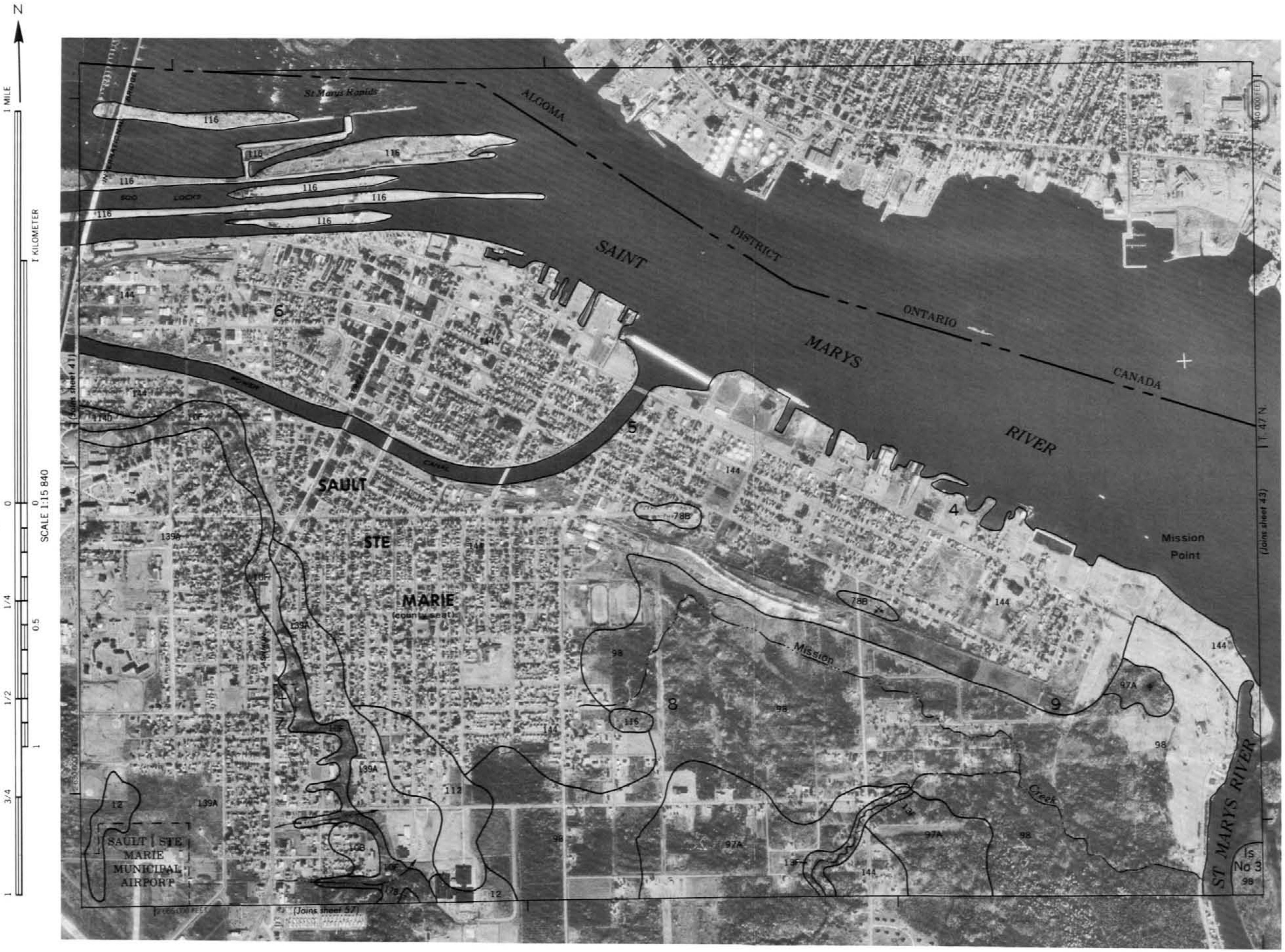

R. 1 E.
2 650 000 FEET
R. 1 W.
T. 47 N.
635 000 FEET
1000 AND 3000-FOOT GRID TICKS
CANADA
ALGOMA
DISTRICT
ST MARYS
RIVER
Point Lewis
SUGAR
ISLAND
Masta Bay
103D
11A
36
103E
105D
(Joins sheet 34)
(Joins sheet 43)
SAINT
MARYS
RIVER
ASHMUN
BAY
Big Point
SOO
LOCKS
POWER
CANAL
INTERNATIONAL
BRIDGE
LAKE
SUPERIOR
STATE
UNIVERSITY
SAULT STE MARIE
(county seat)
SAULT STE MARIE
MUNICIPAL
AIRPORT
CENTRAL
WISCONSIN
Ashmun Creek
Sunrow Creek
Creek
75
1
2
10
11
12
116
144
35
9B
86A
87B
49A
20A
138B
97A
50
36
88A
10B
104B
32A
11A
10F
92A
93F
119
132B
132F
139A
114D
125B
22
21B
(Joins sheet 42)
(Joins next sheet 56)
(Joins sheet 56)
630 000 FEET
2 660 000 FEET
N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 41

(42)

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 42


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
St Marys Rapids
INTERNATIONAL BRIDGE
SOO LOCKS
ALGOMA
DISTRICT
ONTARIO
CANADA
SAINT
MARYS
RIVER
POWER
CANAL
SAULT
STE
MARIE
(county seat)
Mission
Creek
Mission Point
ST MARYS RIVER
Is No 3
SAULT STE MARIE MUNICIPAL AIRPORT
(Joins sheet 41)
(Joins sheet 43)
(Joins sheet 57)
T. 47 N.
116
144
139A
10F
12
112
98
97A
78B
13B
4
5
6
7
8
9

CHIPPEWA COUNTY, MICHIGAN NO. 42

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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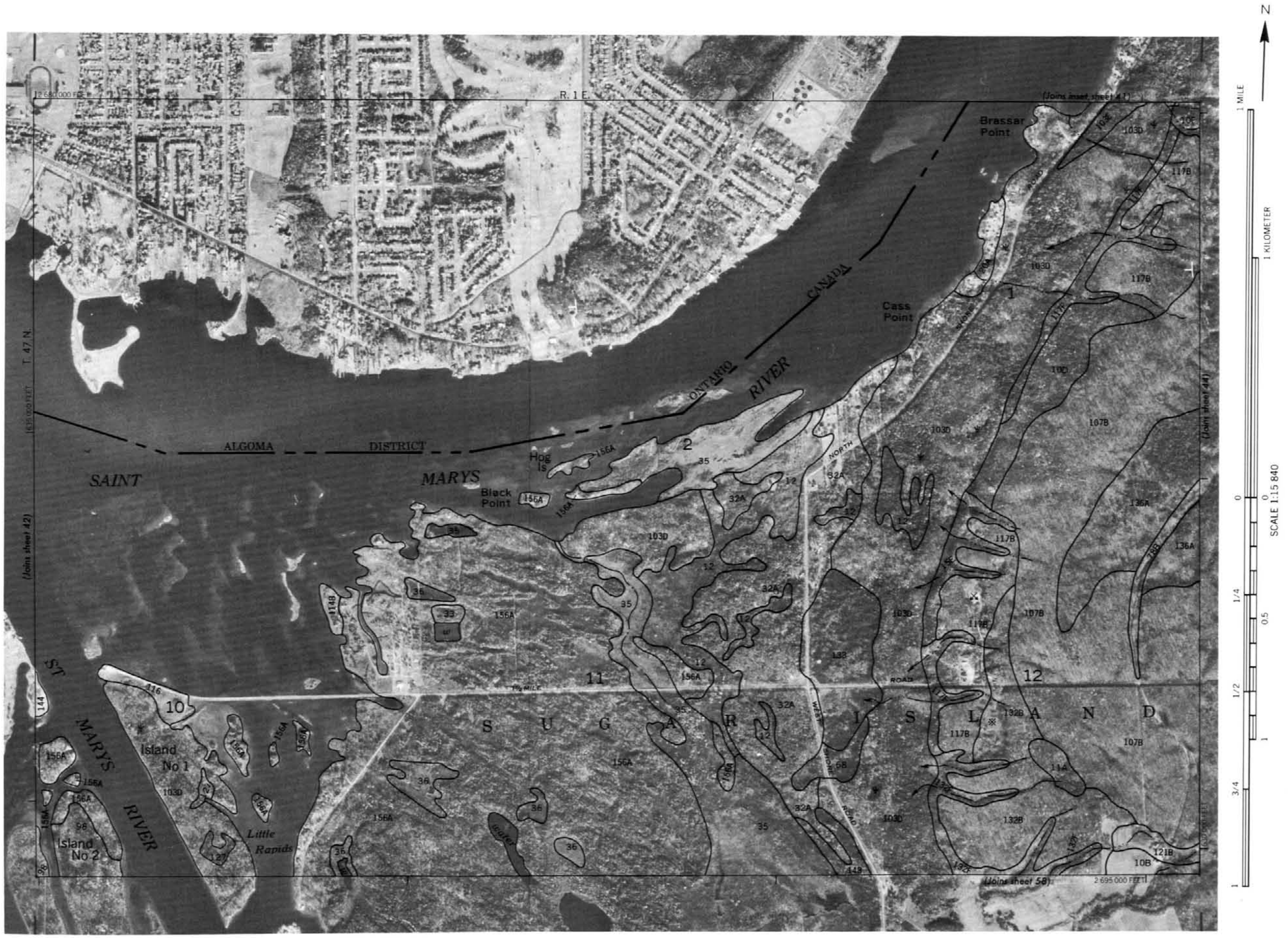
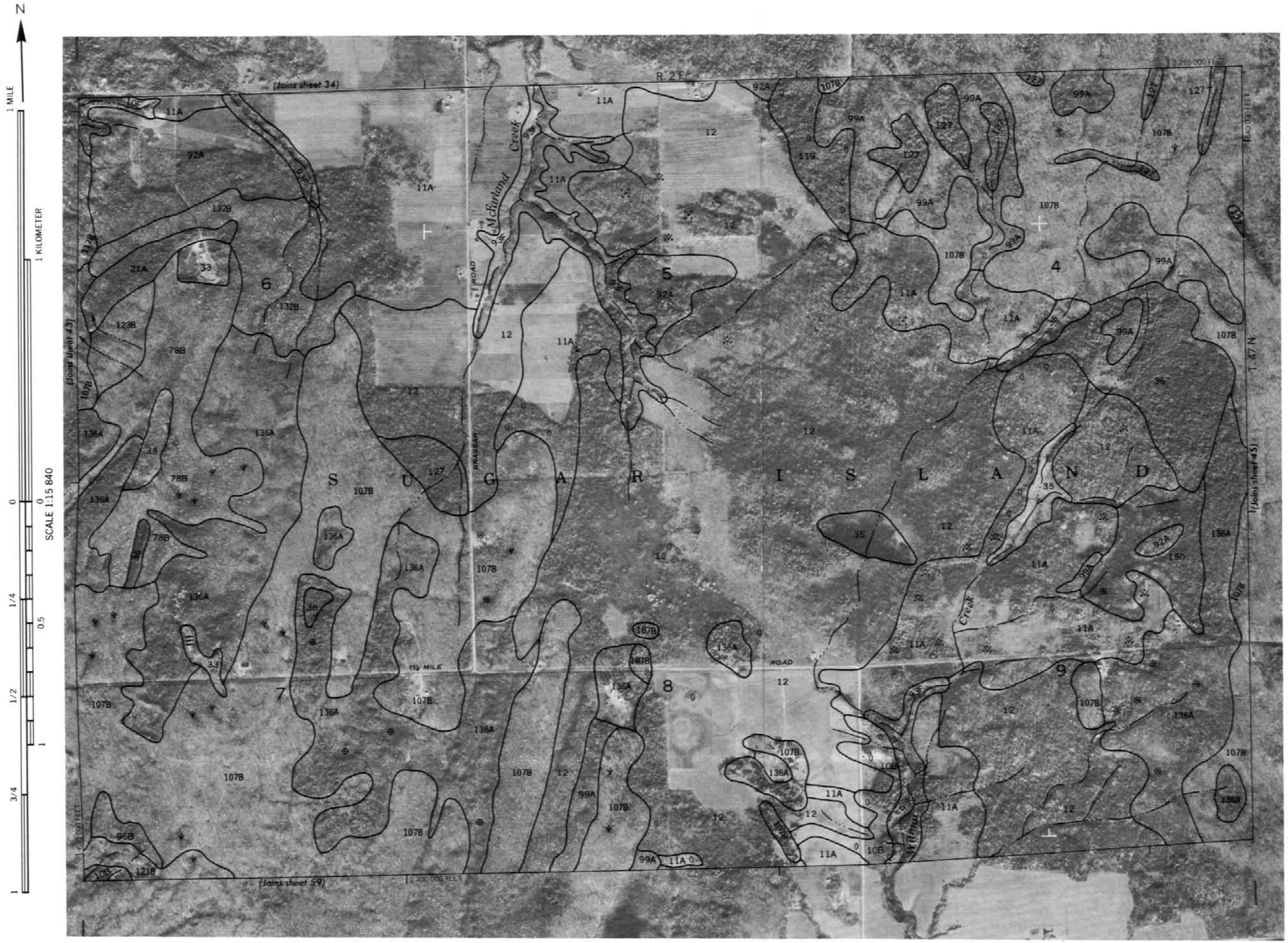
CHIPPEWA COUNTY, MICHIGAN NO. 43


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
R. 1 E.
T. 47 N.
2 680 000 FEET
2 695 000 FEET
(Joins inset sheet 41)
(Joins sheet 44)
(Joins sheet 42)
(Joins sheet 58)
ALGOMA
DISTRICT
ONTARIO
CANADA
SAINT
MARYS
RIVER
ST MARYS RIVER
Brassar Point
Cass Point
Hog Is
Black Point
Island No 1
Island No 2
Little Rapids
SUGAR ISLAND
NORTH
SHORE
ROAD
WEST
SHORE
ROAD
1
2
10
11
12
103D
117B
107B
136A
156A
132B
32A
35
36
12
33
114B
116
144
98
127
11A
10B
121B
10D
W


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 34)
(Joins sheet 43)
(Joins sheet 45)
(Joins sheet 59)
R. 2 E.
T. 47 N.
2 210 000 FEET
2 200 000 FEET
550 000 FEET
S U G A R I S L A N D
McFarland Creek
Creek
ROAD
1½ MILE
4
5
6
7
8
9
11A
12
92A
99A
107B
127
132B
21A
33
35
36
78B
96B
111
119
121B
123B
136A
150

CHIPPEWA COUNTY, MICHIGAN NO. 44

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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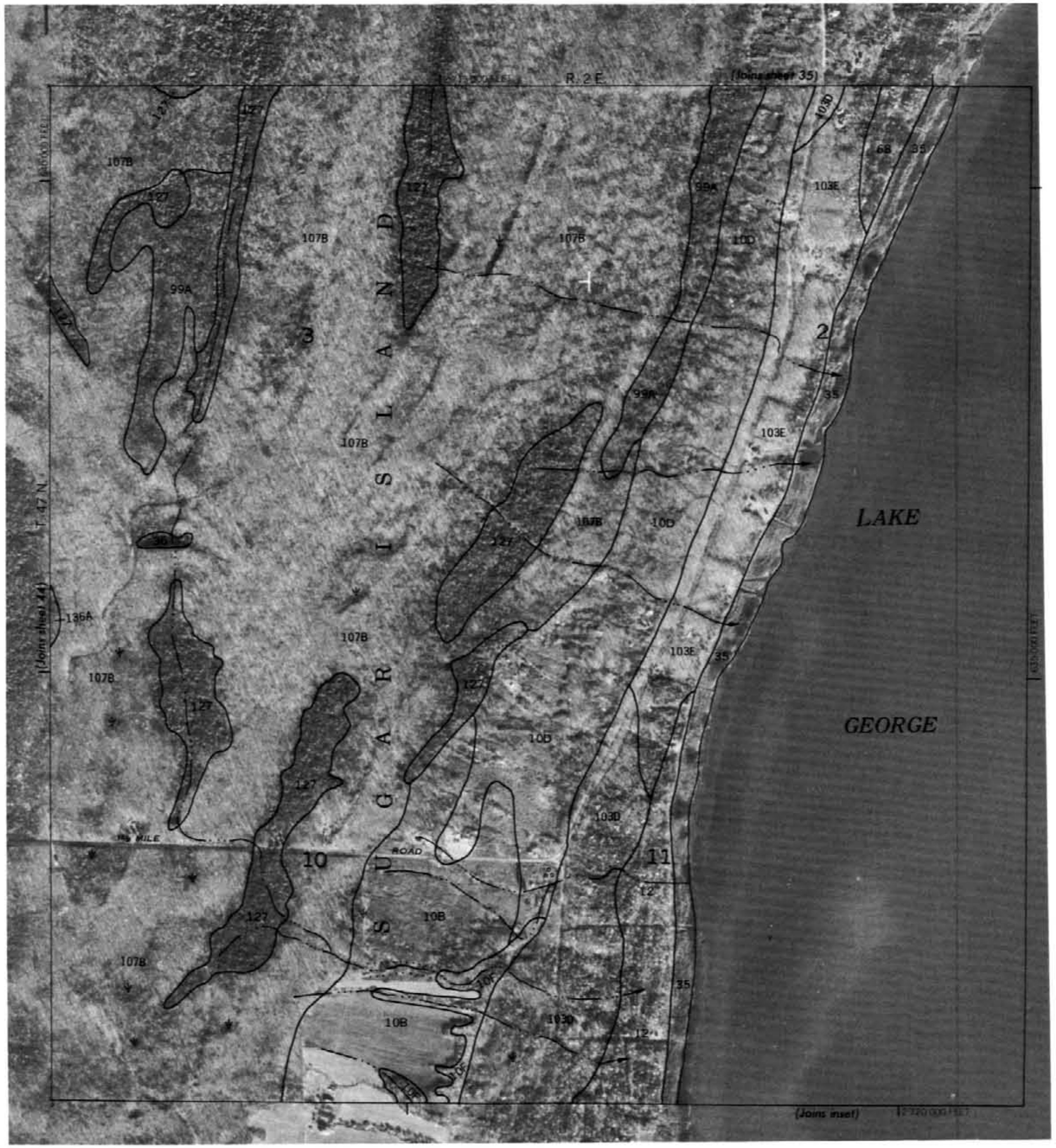
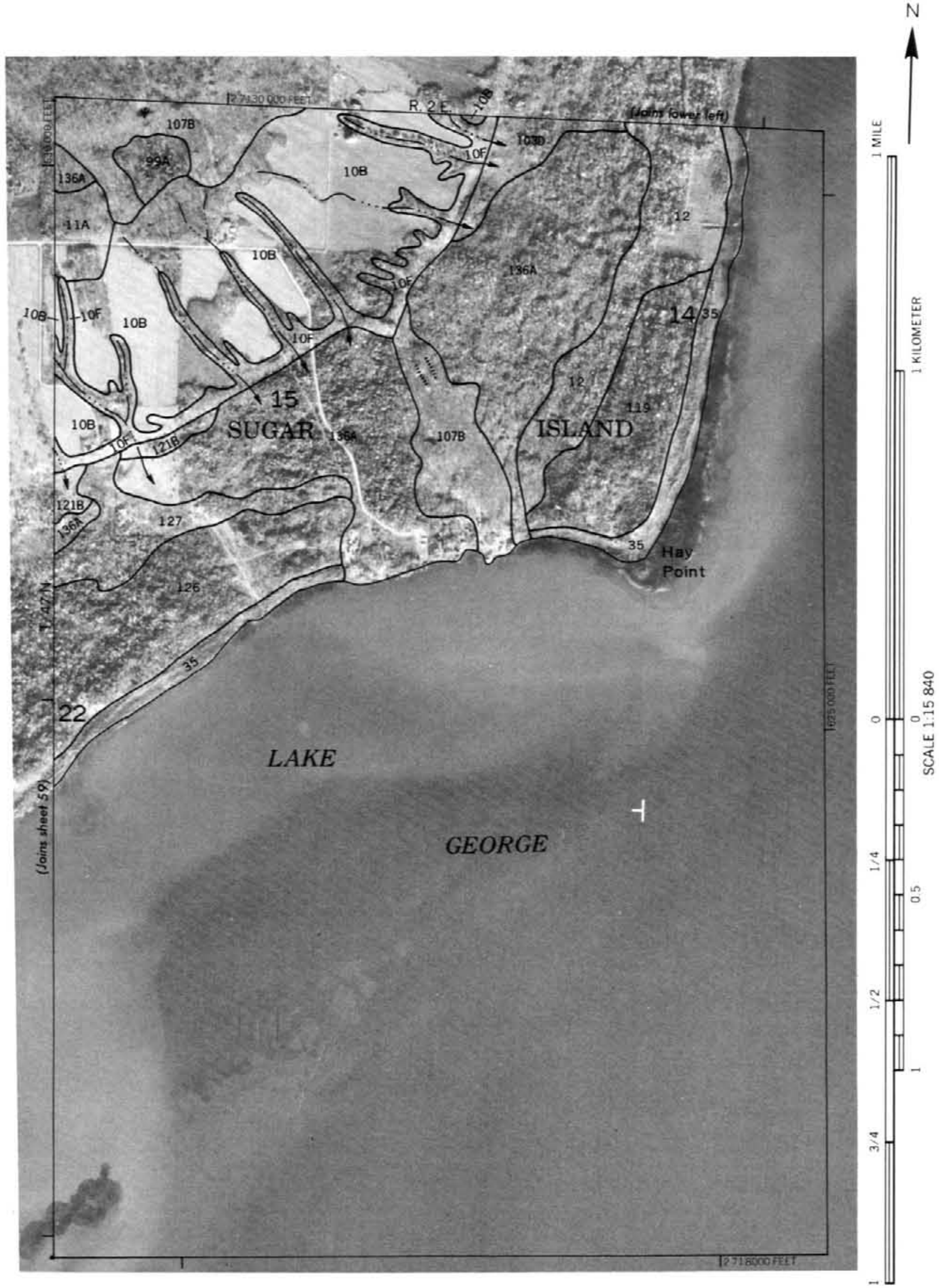
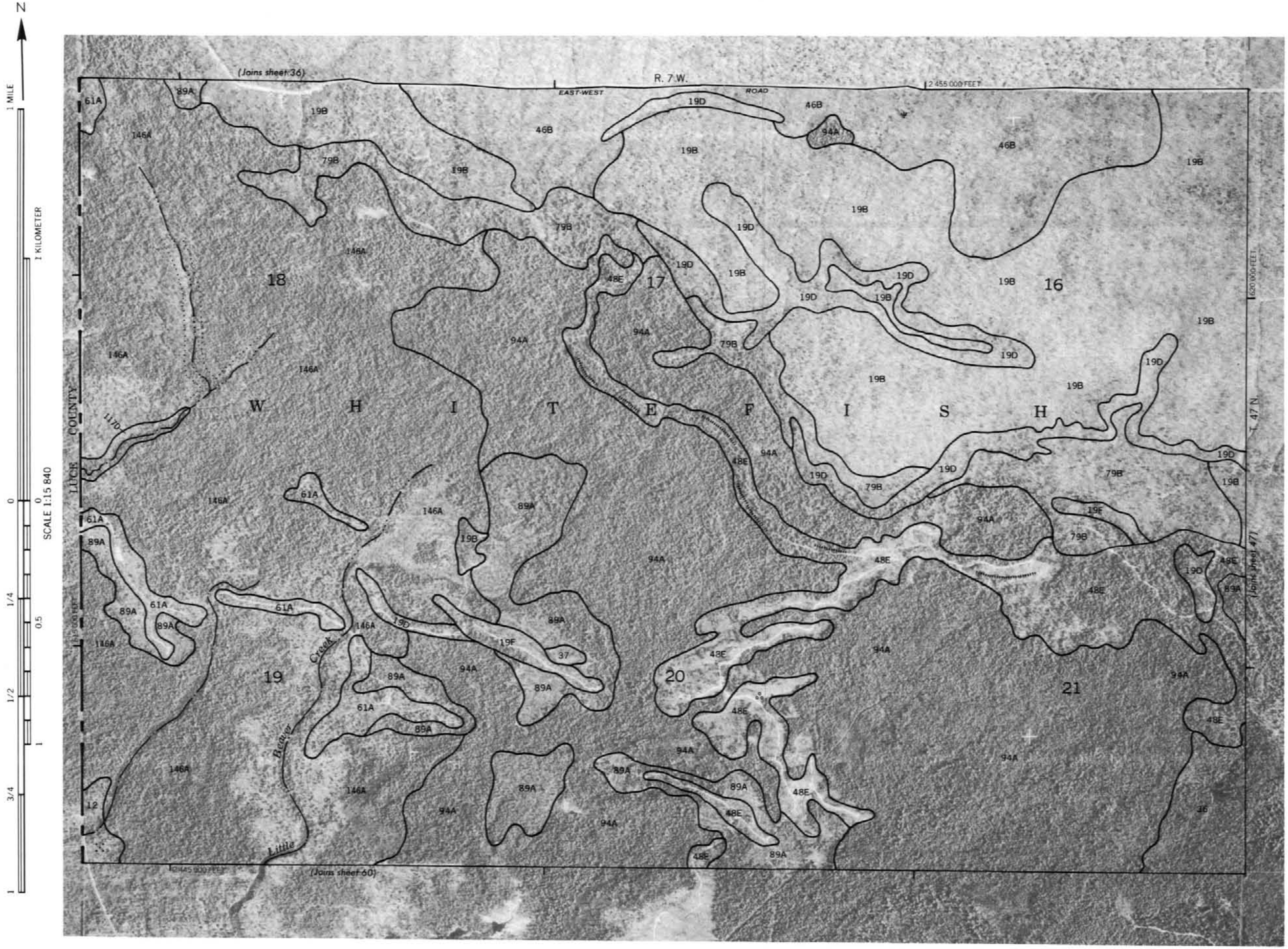
CHIPPEWA COUNTY, MICHIGAN NO. 45


R. 2 E.
(Joins sheet 35)
T. 47 N.
(Joins sheet 44)
(Joins inset)
SUGAR ISLAND
LAKE
GEORGE
3
2
10
11
ROAD
MILE
107B
127
99A
36
136A
10D
103D
103E
6B
35
12
10B
10F


N
R. 2 E.
(Joins lower left)
T. 47 N.
(Joins sheet 59)
SUGAR ISLAND
LAKE
GEORGE
Hay Point
15
14
22
107B
99A
136A
11A
10B
10F
103D
121B
127
126
12
119
35
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 46


N
1 MILE
0
1/4
1/2
3/4
1
1 KILOMETER
0
0.5
1
SCALE 1:15 840
(Joins sheet 36)
R. 7 W.
EAST-WEST
ROAD
2 455 000 FEET
620 000 FEET
T. 47 N.
(Joins sheet 47)
(Joins sheet 60)
2 445 000 FEET
LUCE COUNTY
W H I T E F I S H
18
17
16
19
20
21
61A
89A
19B
146A
79B
46B
19D
94A
48E
117D
89A
19F
37
12
36
Beaver Creek
Little

CHIPPEWA COUNTY, MICHIGAN NO. 46

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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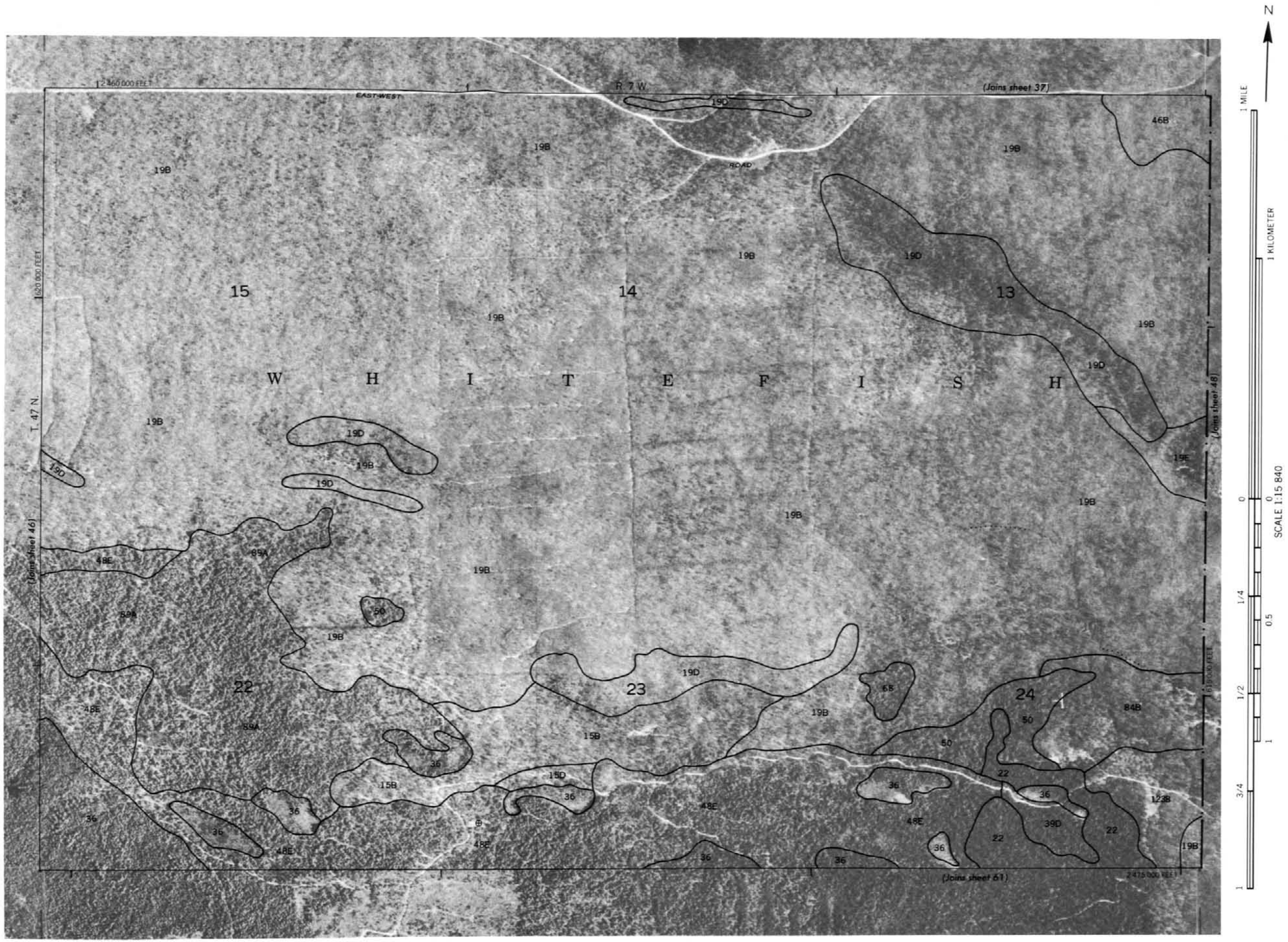
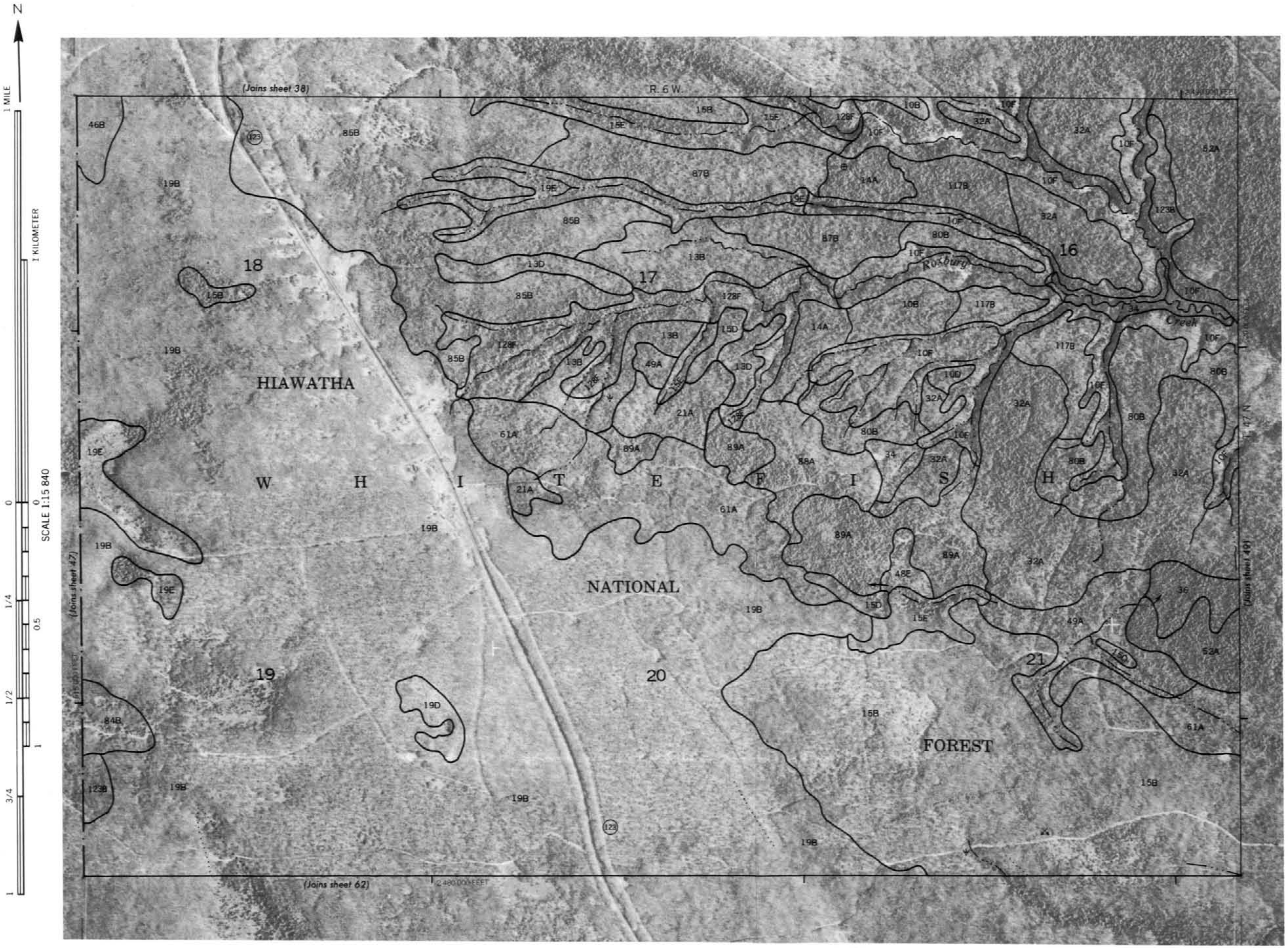
CHIPPEWA COUNTY, MICHIGAN NO. 47

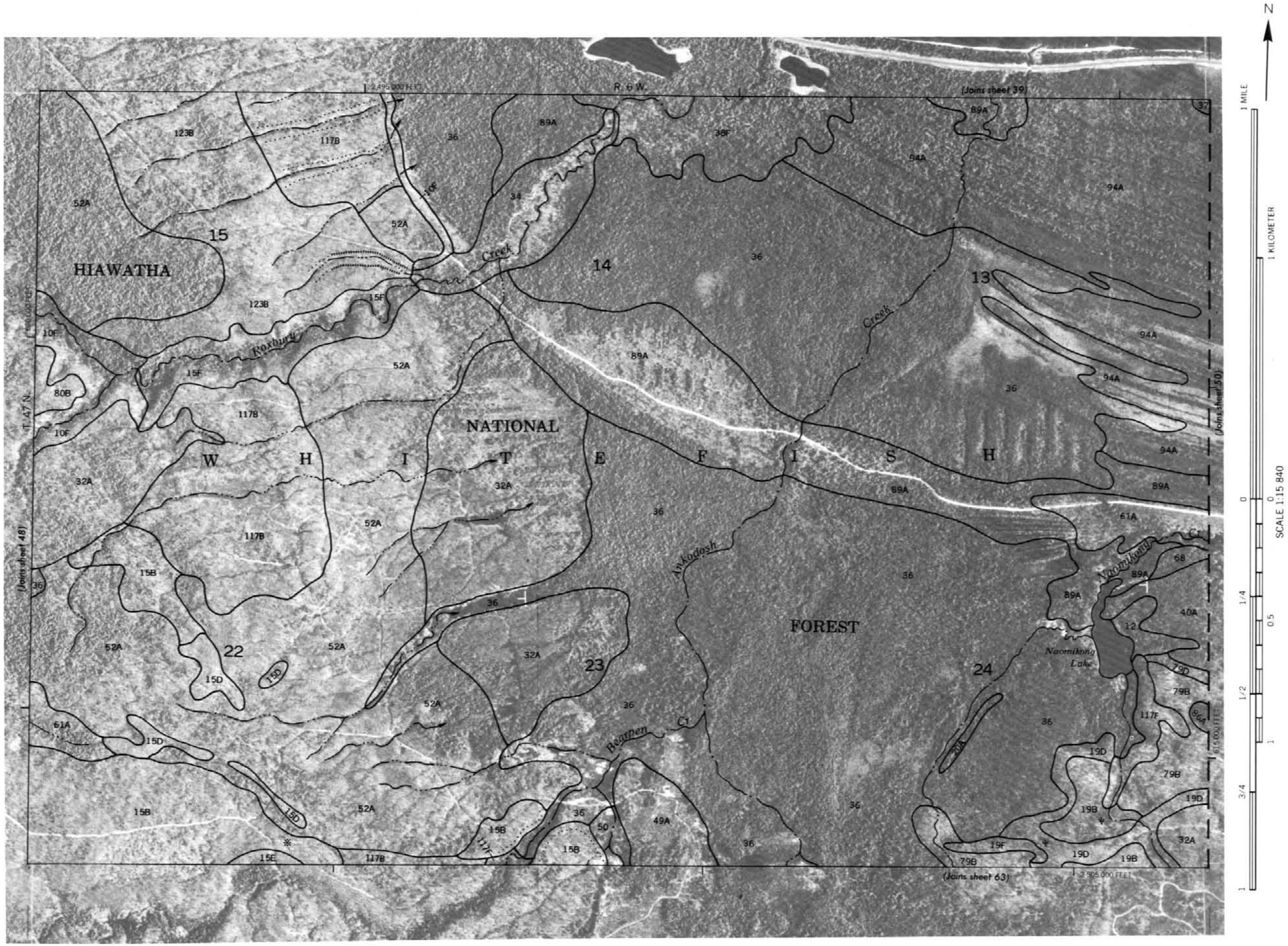

N
R. 7 W.
T. 47 N.
2 460 000 FEET
620 000 FEET
2 475 000 FEET
EAST-WEST
ROAD
(Joins sheet 37)
(Joins sheet 46)
(Joins sheet 48)
(Joins sheet 61)
W H I T E F I S H
15
14
13
22
23
24
19B
19D
19E
46B
48E
89A
50
15B
15D
36
68
84B
123B
39D
22
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 48


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 38)
R. 6 W.
(Joins sheet 47)
(Joins sheet 49)
(Joins sheet 62)
2 480 000 FEET
T. 47 N.
123
HIAWATHA
WHITEFISH
NATIONAL
FOREST
Roxbury
Creek
16
17
18
19
20
21
46B
19B
85B
87B
15B
15E
128F
10B
10F
32A
52A
14A
117B
123B
19E
13D
13B
80B
15D
49A
21A
61A
89A
88A
34
36
10D
21A
19D
84B
48E
15E
15D

CHIPPEWA COUNTY, MICHIGAN NO. 48

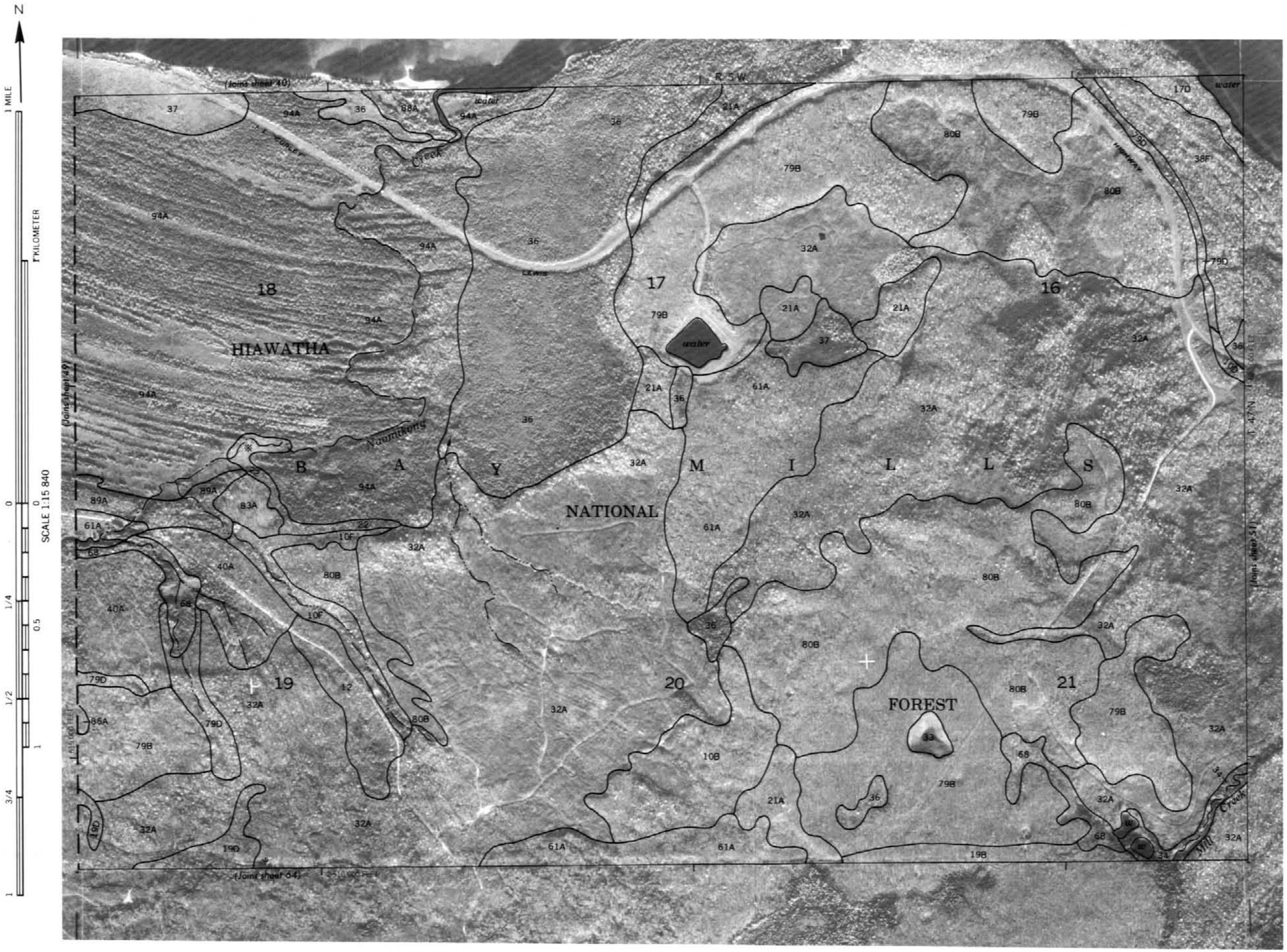
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
2 495 000 FEET
R. 6 W.
(Joins sheet 39)
(Joins sheet 50)
(Joins sheet 63)
(Joins sheet 48)
T. 47 N.
2 505 000 FEET
615 000 FEET
HIAWATHA
NATIONAL
W H I T E F I S H
FOREST
15
14
13
22
23
24
Roxbury
Creek
Creek
Ankodosh
Beaupen
Cr
Naomikong
Cr
Naomikong Lake
123B
117B
36
89A
38F
94A
37
52A
10F
34
15F
80B
32A
15B
15D
61A
15E
117F
50
49A
68
40A
12
79D
79B
86A
19D
19B
19F
20A

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 49

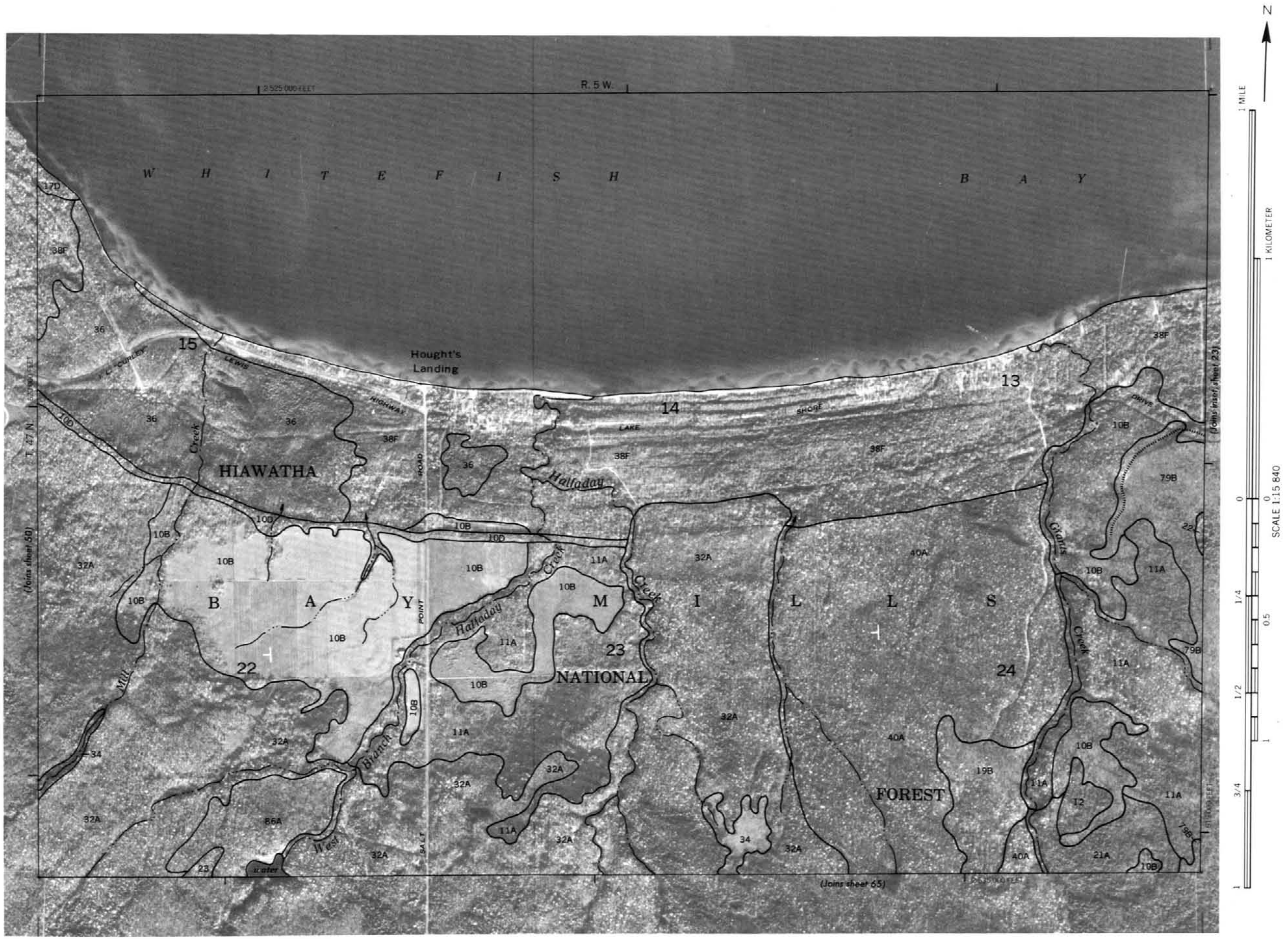
SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 50


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 40)
(Joins sheet 49)
(Joins sheet 51)
(Joins sheet 64)
R. 5 W.
T. 47 N.
HIAWATHA
NATIONAL
FOREST
B A Y
M I L L S
Naomikong
Lewis
Creek
Mill Creek
water
Highway
17
18
16
19
20
21
37
94A
36
88A
21A
79B
80B
17D
38F
32A
61A
89A
83A
22
10F
40A
80B
68
79D
86A
19D
12
10B
33
19B
34
w

CHIPPEWA COUNTY, MICHIGAN NO. 50

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981- 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

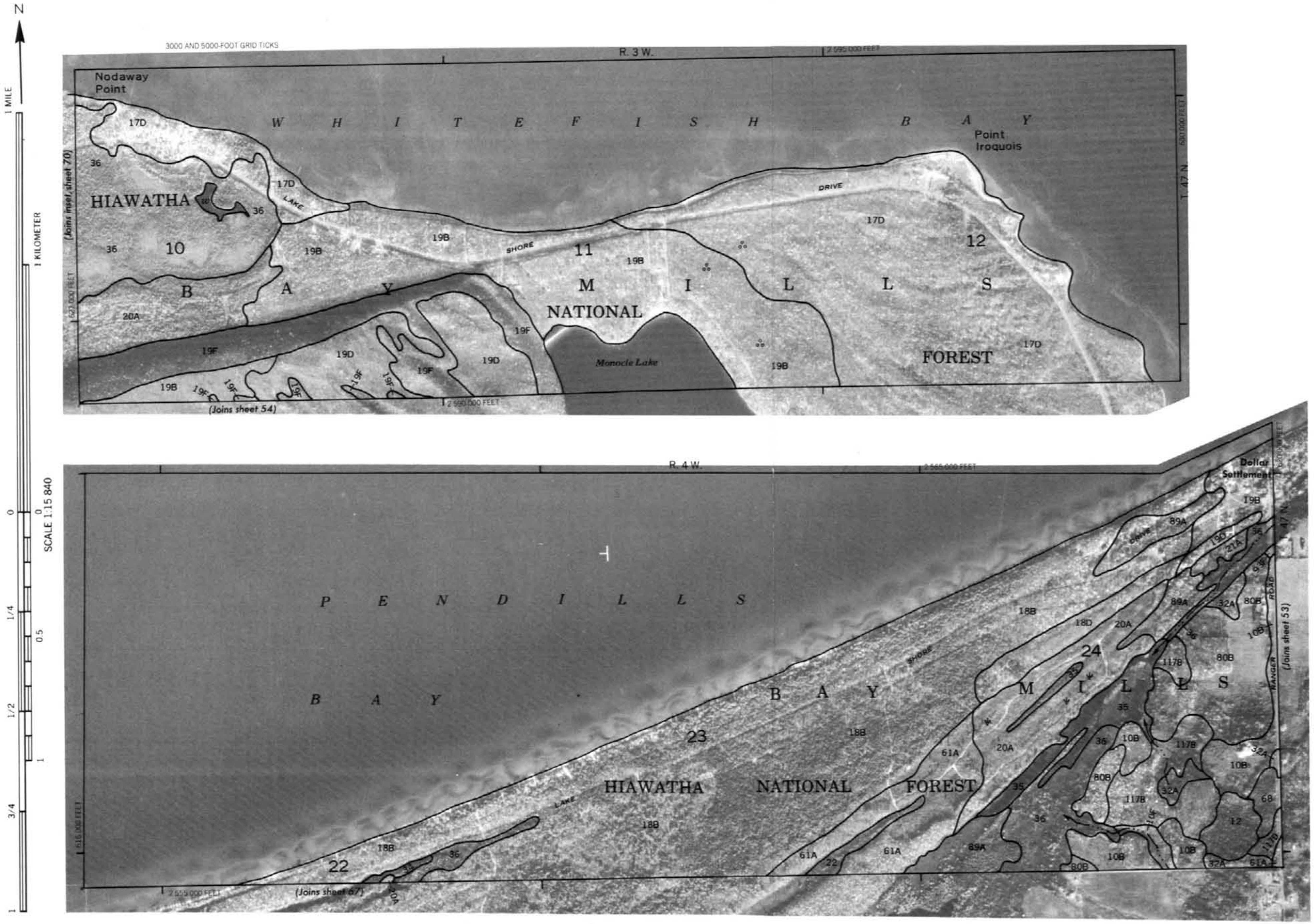
(51)


W H I T E F I S H B A Y
2 525 000 FEET
R. 5 W.
T. 47 N.
17D
38F
36
15
LEWIS
CURLEY
100
Creek
HIAWATHA
HIGHWAY
Hought's Landing
ROAD
36
38F
14
LAKE
SHORE
DRIVE
13
38F
10B
79B
Halfaday
10D
10B
10D
11A
32A
40A
Gitchi
Creek
(Joins sheet 50)
(Joins inset sheet 23)
32A
10B
B A Y
POINT
10B
Creek
Halfaday
M I L L S
22
11A
23
NATIONAL
24
11A
79B
Mill
34
32A
10B
Branch
32A
11A
32A
32A
40A
19B
11A
10B
12
FOREST
32A
86A
West
32A
SALT
11A
32A
34
32A
40A
21A
10B
79B
23
water
(Joins sheet 65)
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

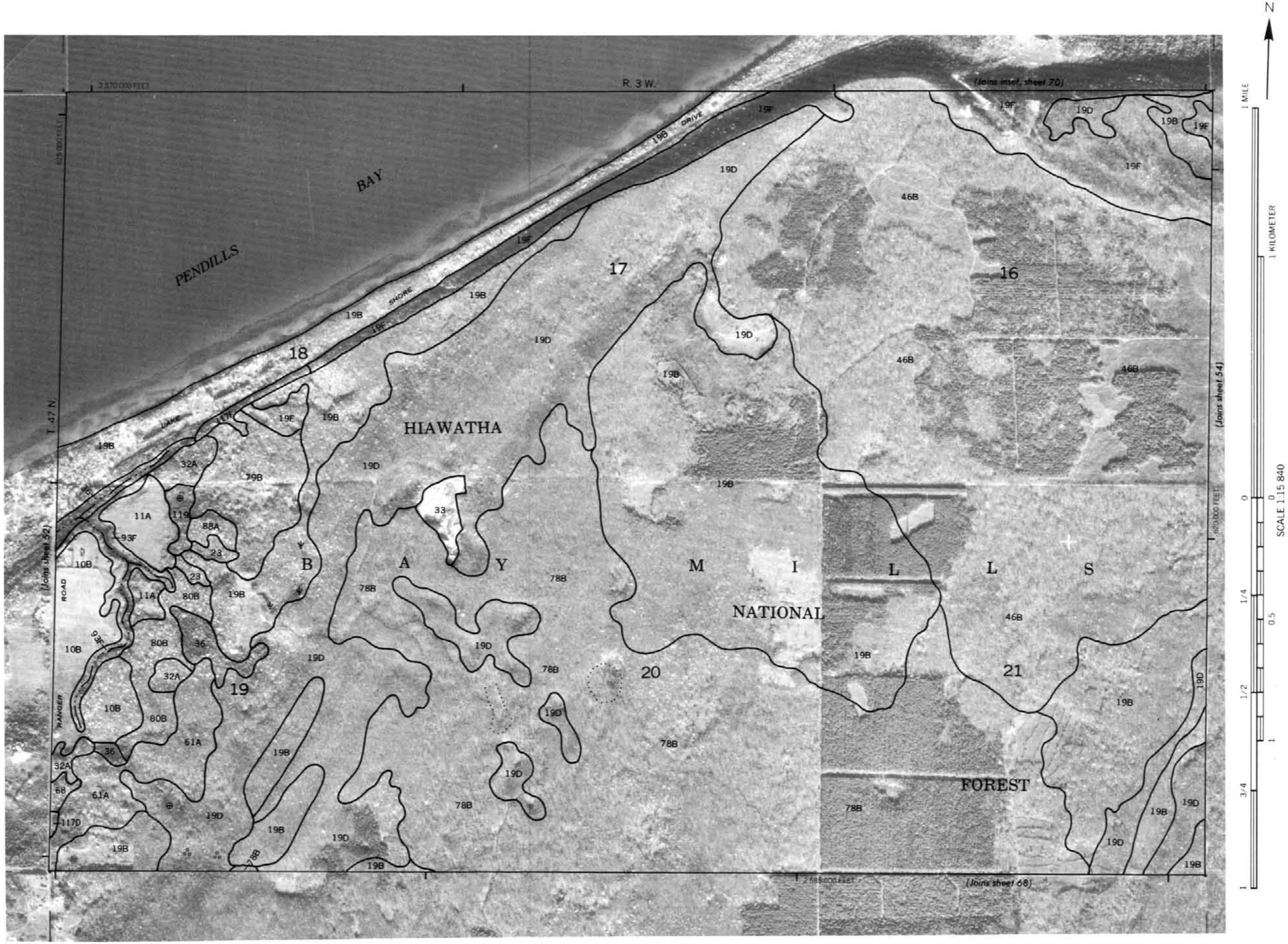
CHIPPEWA COUNTY, MICHIGAN NO. 51

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 52


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
3000 AND 5000-FOOT GRID TICKS
R. 3 W.
2 595 000 FEET
Nodaway Point
W H I T E F I S H B A Y
Point Iroquois
T. 47 N.
(Joins inset, sheet 70)
HIAWATHA
B A Y M I L L S
NATIONAL
FOREST
Monocle Lake
LAKE
SHORE
DRIVE
10
11
12
17D
36
20A
19B
19D
19F
(Joins sheet 54)
2 590 000 FEET
R. 4 W.
2 565 000 FEET
Dollar Settlement
P E N D I L L S
B A Y
HIAWATHA NATIONAL FOREST
B A Y M I L L S
22
23
24
18B
18D
20A
61A
89A
35
36
10B
80B
117B
32A
12
68
11D
21A
19B
19D
RANGER ROAD
(Joins sheet 53)
(Joins sheet 67)
2 555 000 FEET
616 000 FEET

CHIPPEWA COUNTY, MICHIGAN NO. 52

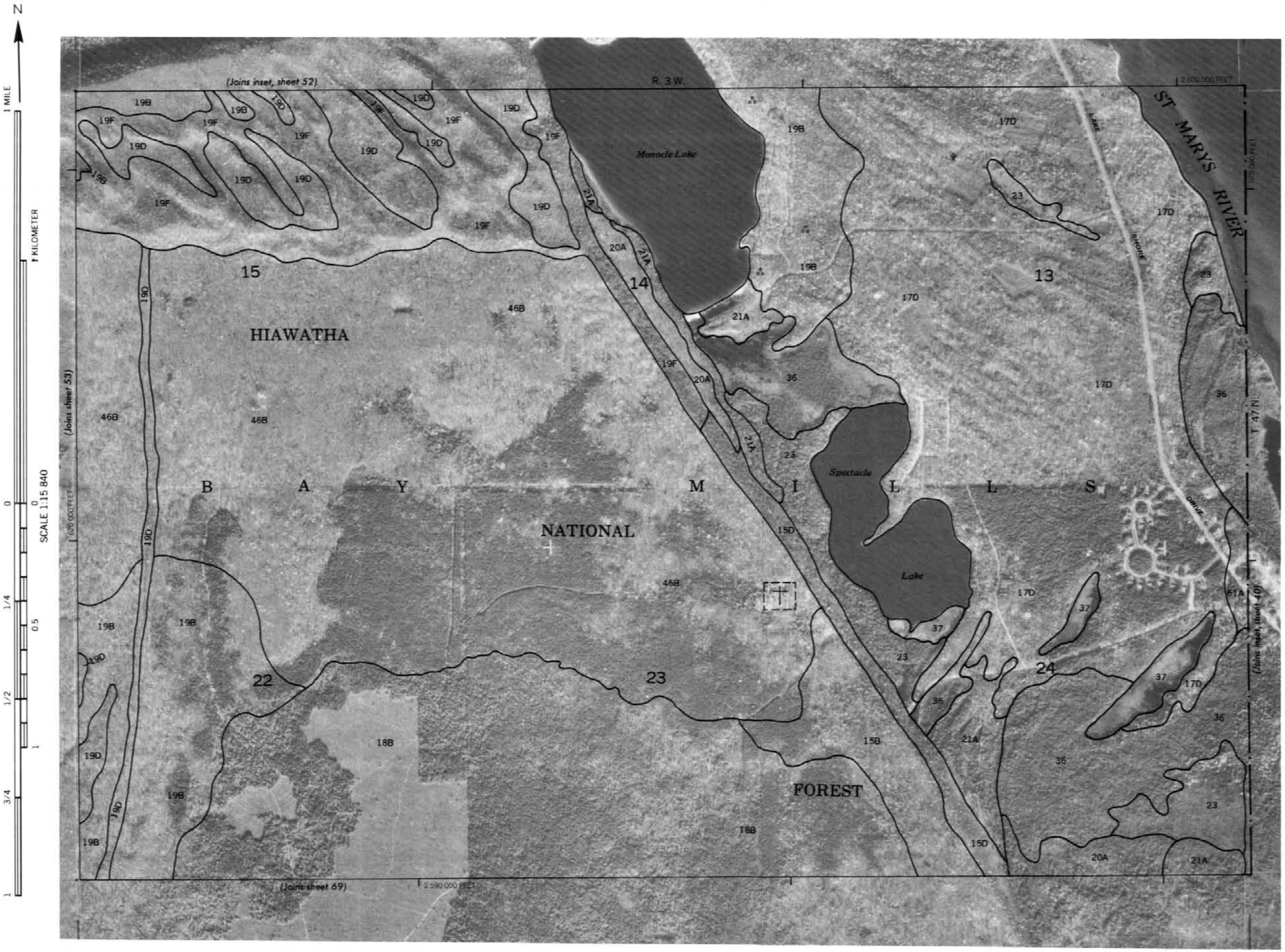
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
2 570 000 FEET
R. 3 W.
(Joins inset, sheet 70)
625 000 FEET
T. 47 N.
(Joins sheet 52)
(Joins sheet 54)
620 000 FEET
2 585 000 FEET
(Joins sheet 68)
PENDILLS
BAY
LAKE
SHORE
DRIVE
RANGER
ROAD
HIAWATHA
NATIONAL
FOREST
B A Y M I L L S
16
17
18
19
20
21
19B
19D
19E
19F
46B
78B
79B
10B
11A
11B
23
32A
33
36
61A
68
80B
88A
93F
117D
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 53

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 54


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins inset, sheet 52)
(Joins sheet 53)
(Joins sheet 69)
(Joins inset, sheet 40)
R. 3 W.
T. 47 N.
2 600 000 FEET
2 590 000 FEET
620 000 FEET
625 000 FEET
ST MARYS RIVER
Monocle Lake
Spectacle Lake
LAKE SHORE DRIVE
HIAWATHA
NATIONAL
FOREST
B A Y M I L L S
15
14
13
22
23
24
19B
19F
19D
19B
19D
19F
19D
19F
19D
19D
19D
19F
19D
19F
19D
19F
19F
19D
21A
20A
21A
19B
19B
17D
23
17D
23
17D
36
21A
36
19F
20A
46B
46B
46B
46B
19D
19D
21A
23
15D
17D
36
37
17D
61A
23
37
17D
36
35
36
21A
15B
18B
18B
19B
19B
19D
19D
19D
19B
19B
15D
20A
21A
23

CHIPPEWA COUNTY, MICHIGAN NO. 54

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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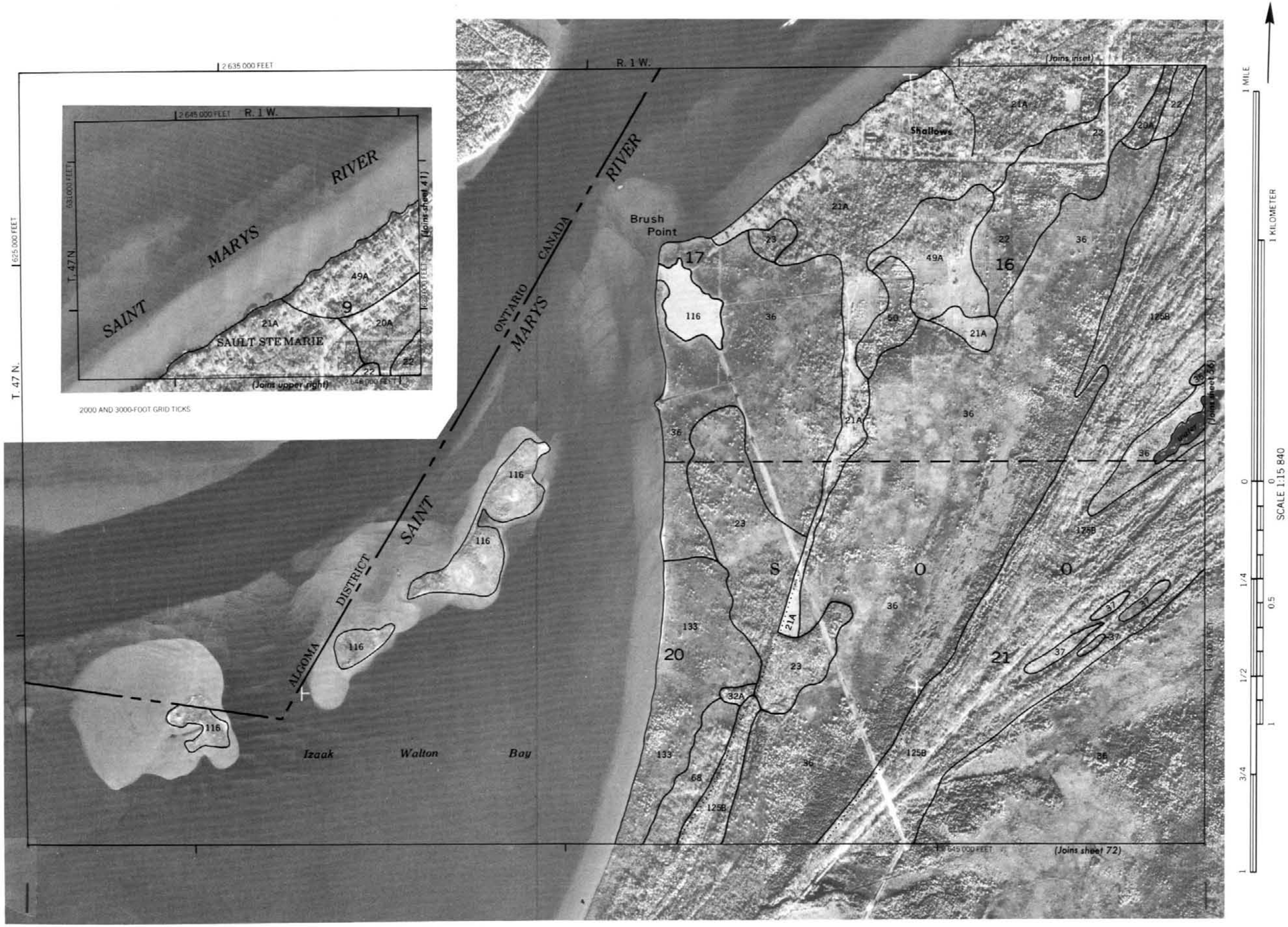
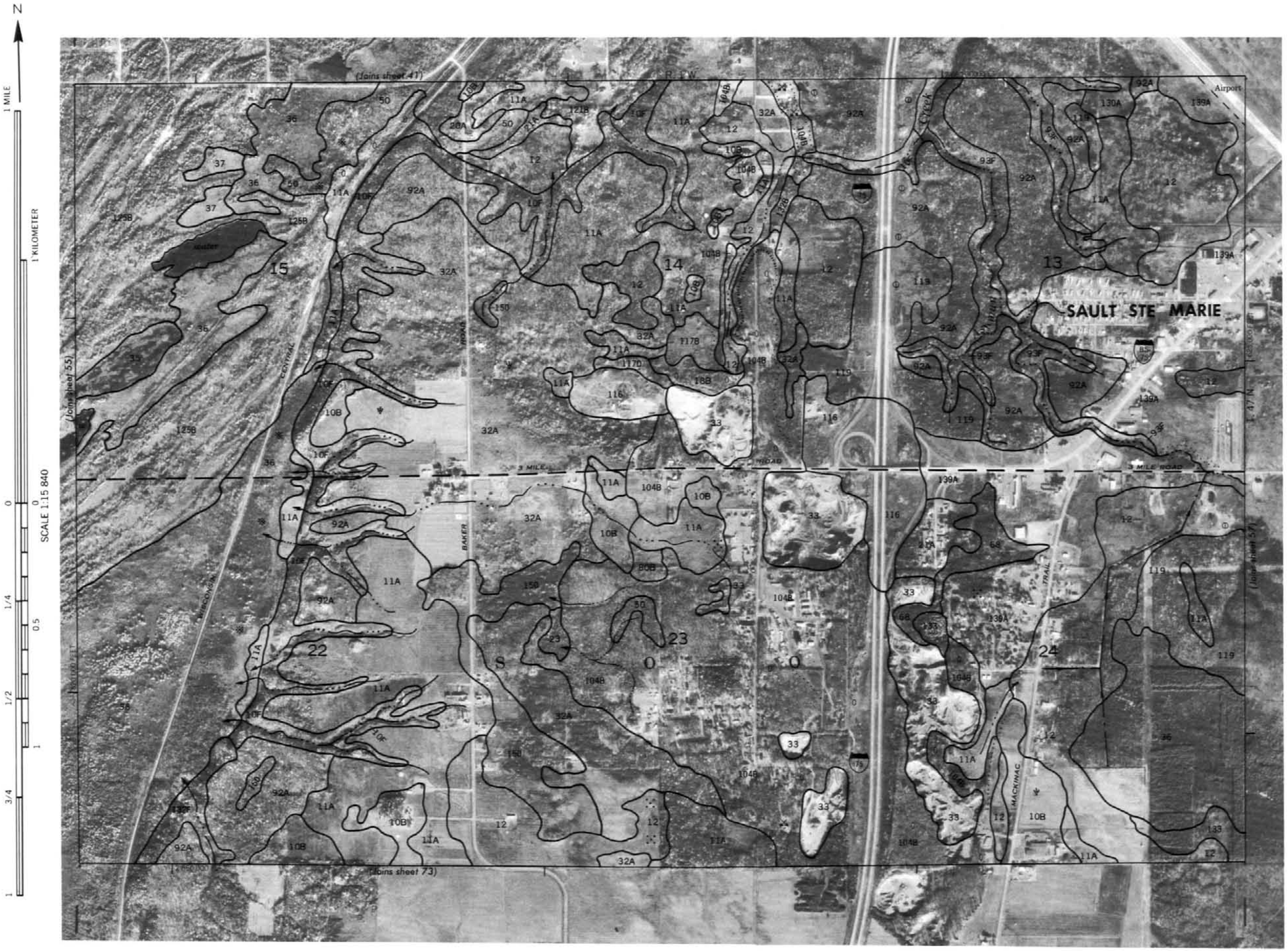
CHIPPEWA COUNTY, MICHIGAN NO. 55


N
R. 1 W.
2 635 000 FEET
625 000 FEET
T. 47 N.
(Joins inset)
(Joins sheet 56)
(Joins sheet 72)
2 645 000 FEET
SAINT MARYS RIVER
ONTARIO
CANADA
ALGOMA DISTRICT
Brush Point
Shallows
Izaak Walton Bay
S O O
16
17
20
21
21A
22
20A
23
36
37
49A
50
32A
68
116
125B
133
Water
2 645 000 FEET
R. 1 W.
631 000 FEET
T. 47 N.
(Joins sheet 41)
SAINT MARYS RIVER
SAULT STE MARIE
9
49A
21A
20A
22
(Joins upper right)
2 648 000 FEET
2000 AND 3000-FOOT GRID TICKS
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

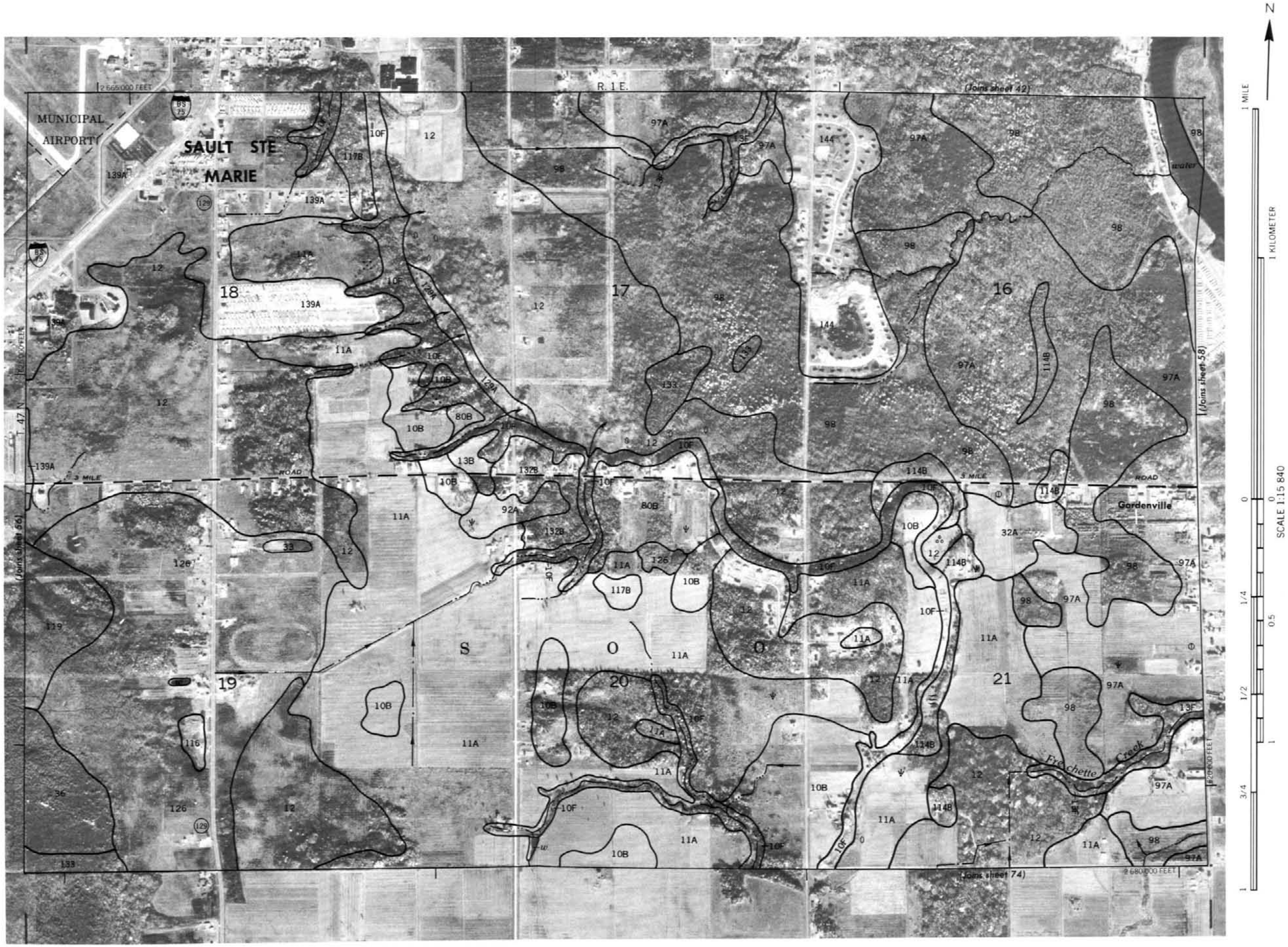
SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 56


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
(Joins sheet 41)
(Joins sheet 55)
(Joins sheet 57)
(Joins sheet 73)
SAULT STE MARIE
Airport
R. 1 W.
T. 47 N.
15
14
13
22
23
24
3 MILE ROAD
CENTRAL
BAKER
MACKINAC TRAIL
Creek
water
S
O
O
11A
10F
10B
12
32A
92A
93F
104B
119
125B
130A
139A
33
36
37
50
68

CHIPPEWA COUNTY, MICHIGAN NO. 56

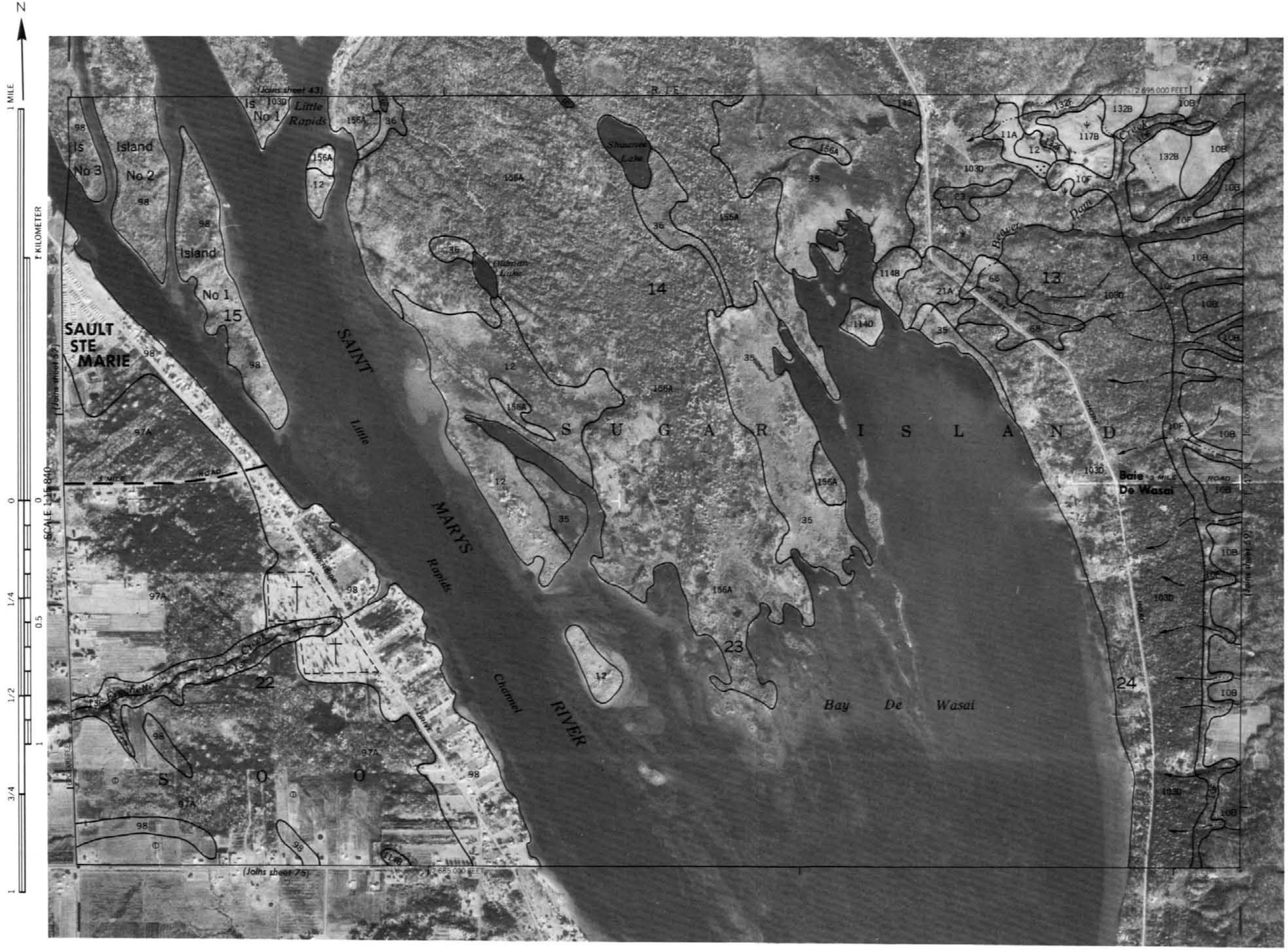
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 57


N
MUNICIPAL AIRPORT
SAULT STE MARIE
2 665 000 FEET
R. 1 E.
(Joins sheet 42)
(Joins sheet 58)
(Joins sheet 74)
(Joins sheet 56)
T. 47 N.
3 MILE ROAD
Gordenville
Frechette Creek
water
2 680 000 FEET
16
17
18
19
20
21
12
10F
117B
139A
11A
10B
80B
13B
132B
92A
126
117B
33
119
116
36
133
97A
98
144
114B
32A
13F
12
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 57

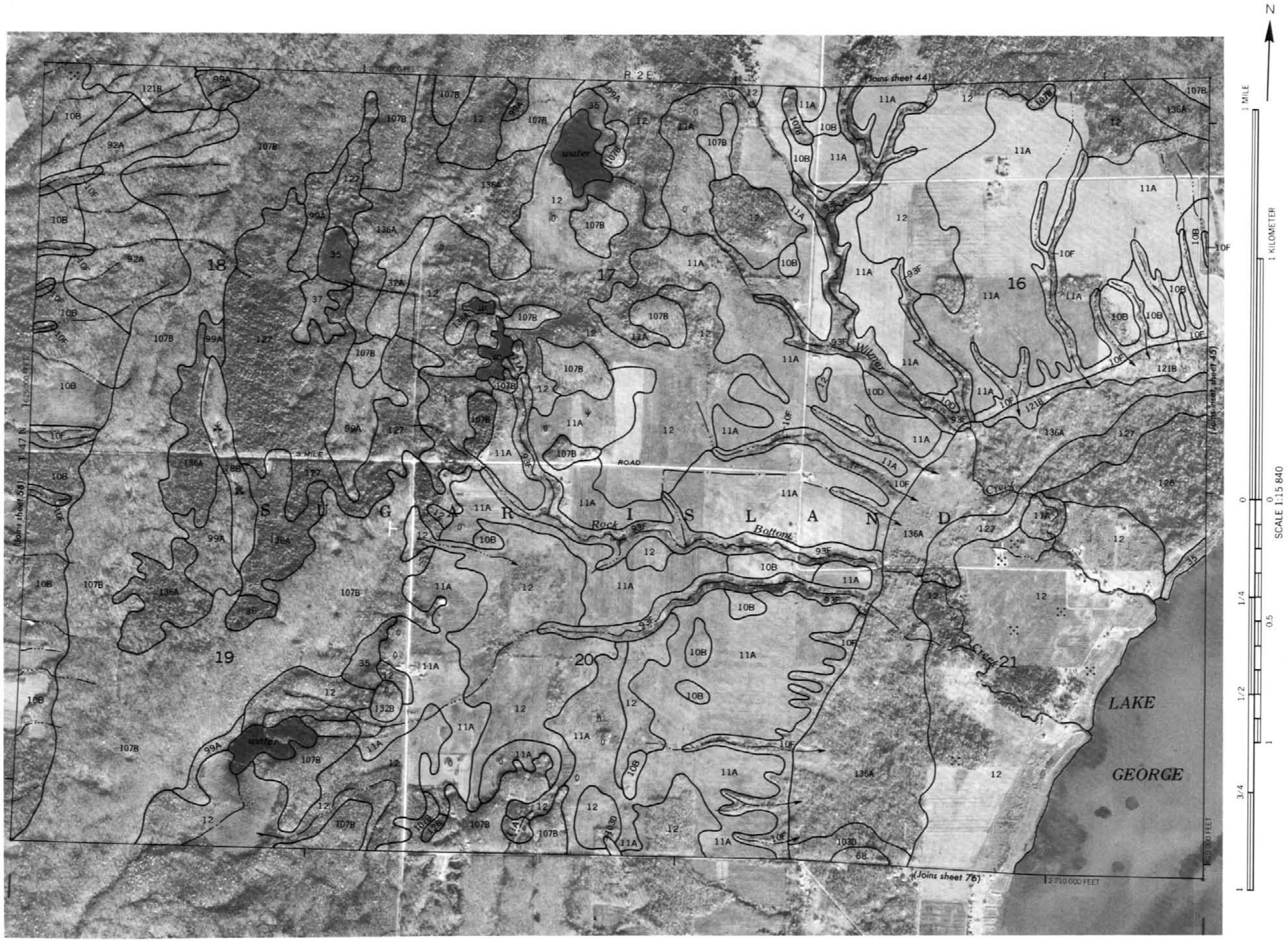

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 43)
(Joins sheet 57)
(Joins sheet 59)
(Joins sheet 75)
R. 1 E.
2 695 000 FEET
2 685 000 FEET
SAULT STE MARIE
Is No 3
Island No 2
Island No 1
Is No 1
Little Rapids
Shoemaker Lake
Oldman Lake
SAINT MARYS RIVER
Little Rapids
Channel
SUGAR ISLAND
Bay De Wasai
Baie De Wasai
Beaver Dam Creek
Creek
3 MILE ROAD
14
15
13
22
23
24
S O O
98
97A
156A
12
35
36
103D
114B
114D
21A
23
66
68
10B
10F
11A
117B
132B

CHIPPEWA COUNTY, MICHIGAN NO. 58

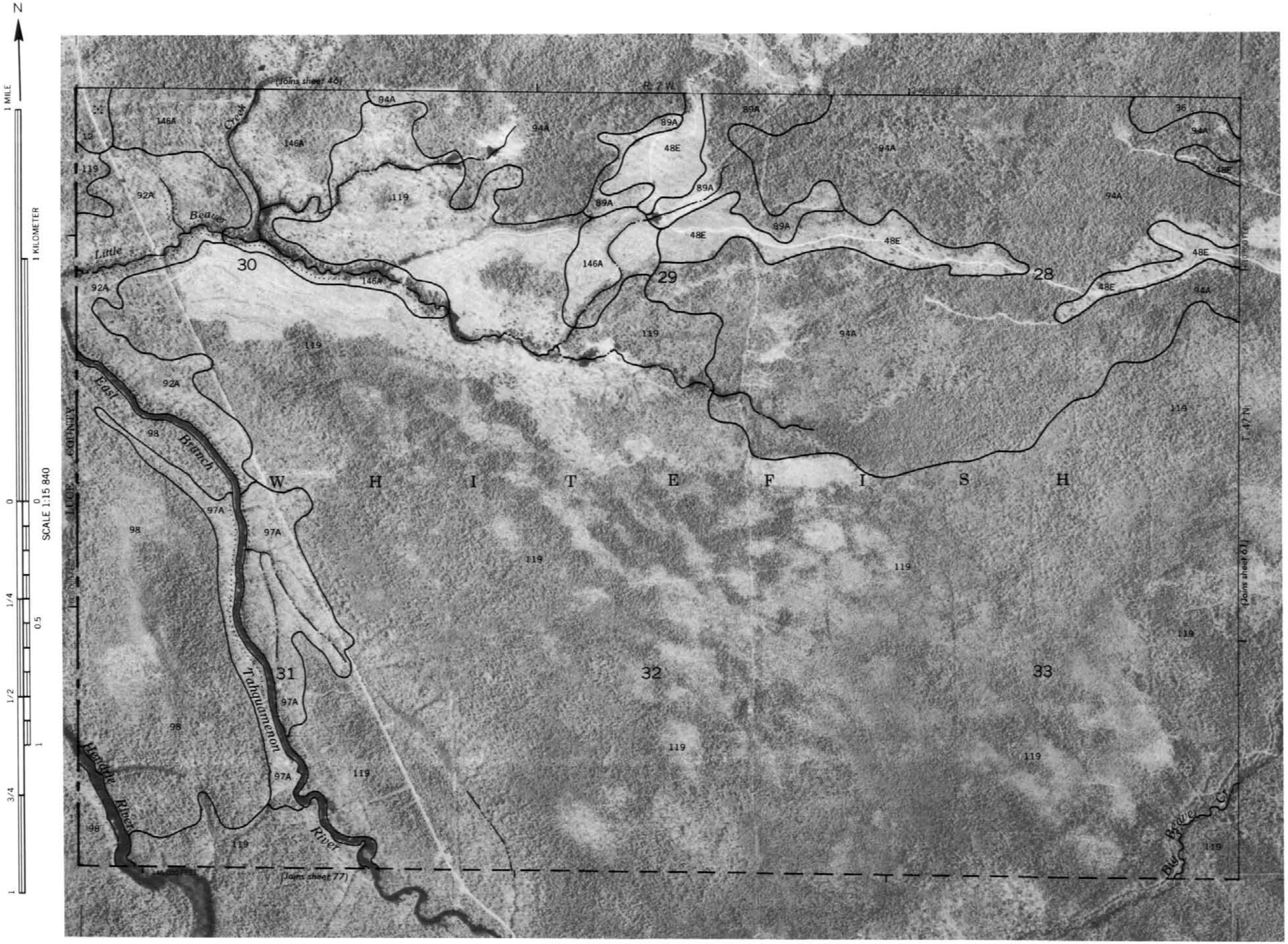
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 59


N
R. 2 E.
T. 47 N.
(Joins sheet 44)
(Joins sheet 45)
(Joins sheet 58)
(Joins sheet 76)
S U G A R I S L A N D
3 MILE ROAD
Rock Bottoms
Creek
LAKE GEORGE
water
16
17
18
19
20
21
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
2 710 000 FEET
10B
10F
10D
11A
12
35
37
92A
93F
99A
107B
121B
126
127
132B
136A
0

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 60

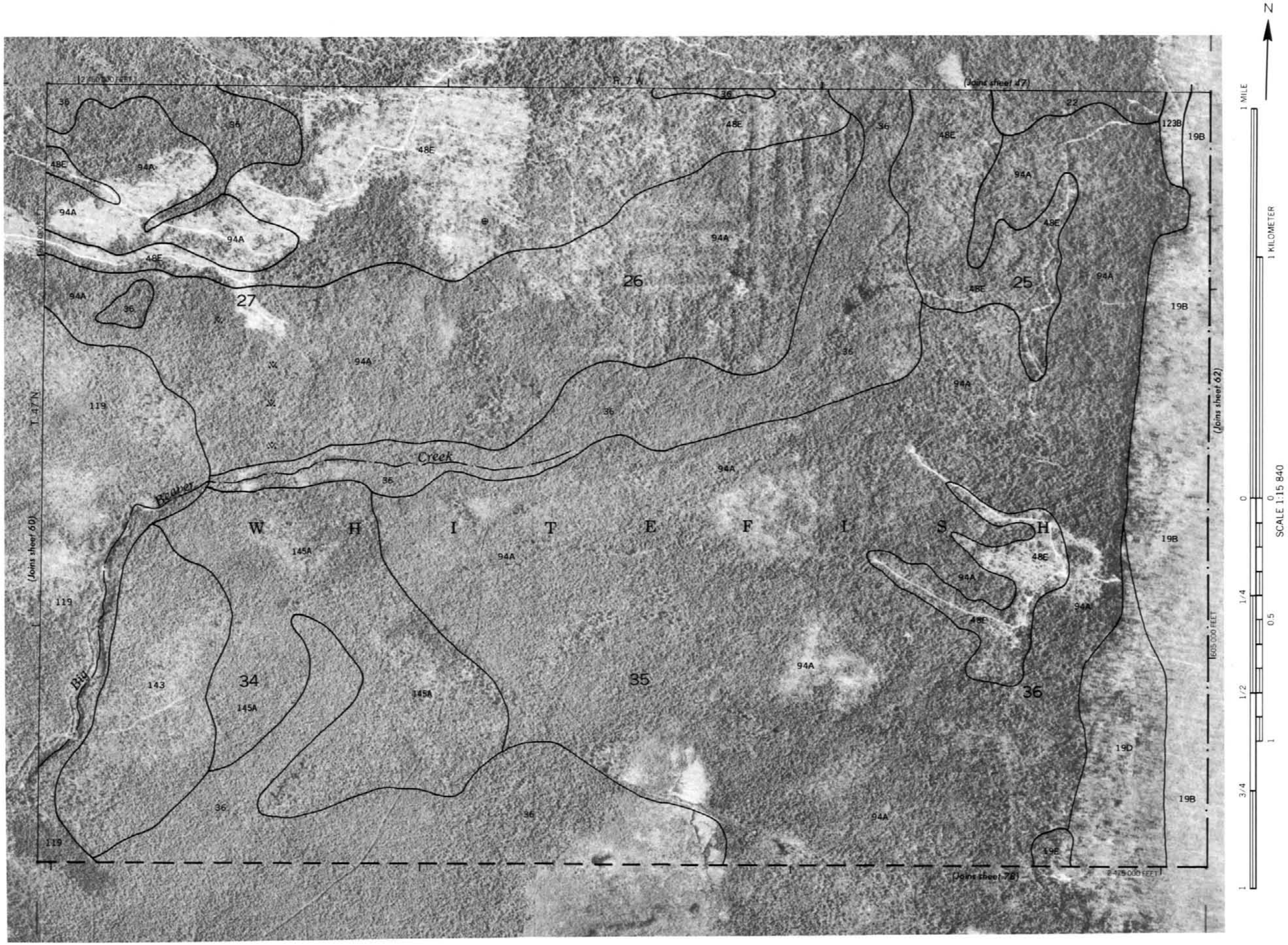

N
1 MILE
1 KILOMETER
0
0
SCALE 1:15 840
1/4
0.5
1/2
1
3/4
1
(Joins sheet 46)
R. 7 W.
146A
12
119
92A
Creek
Beaver
Little
146A
94A
94A
119
89A
48E
89A
89A
89A
48E
146A
30
146A
29
119
119
94A
48E
89A
48E
28
36
94A
48E
94A
48E
48E
94A
94A
92A
92A
East
Branch
98
LUCE COUNTY
W H I T E F I S H
97A
97A
98
119
119
119
T. 47 N.
(Joins sheet 61)
119
31
32
33
Tahquamenon
97A
98
119
119
Hendrie River
97A
119
98
119
River
Big Beaver Cr.
119
(Joins sheet 77)

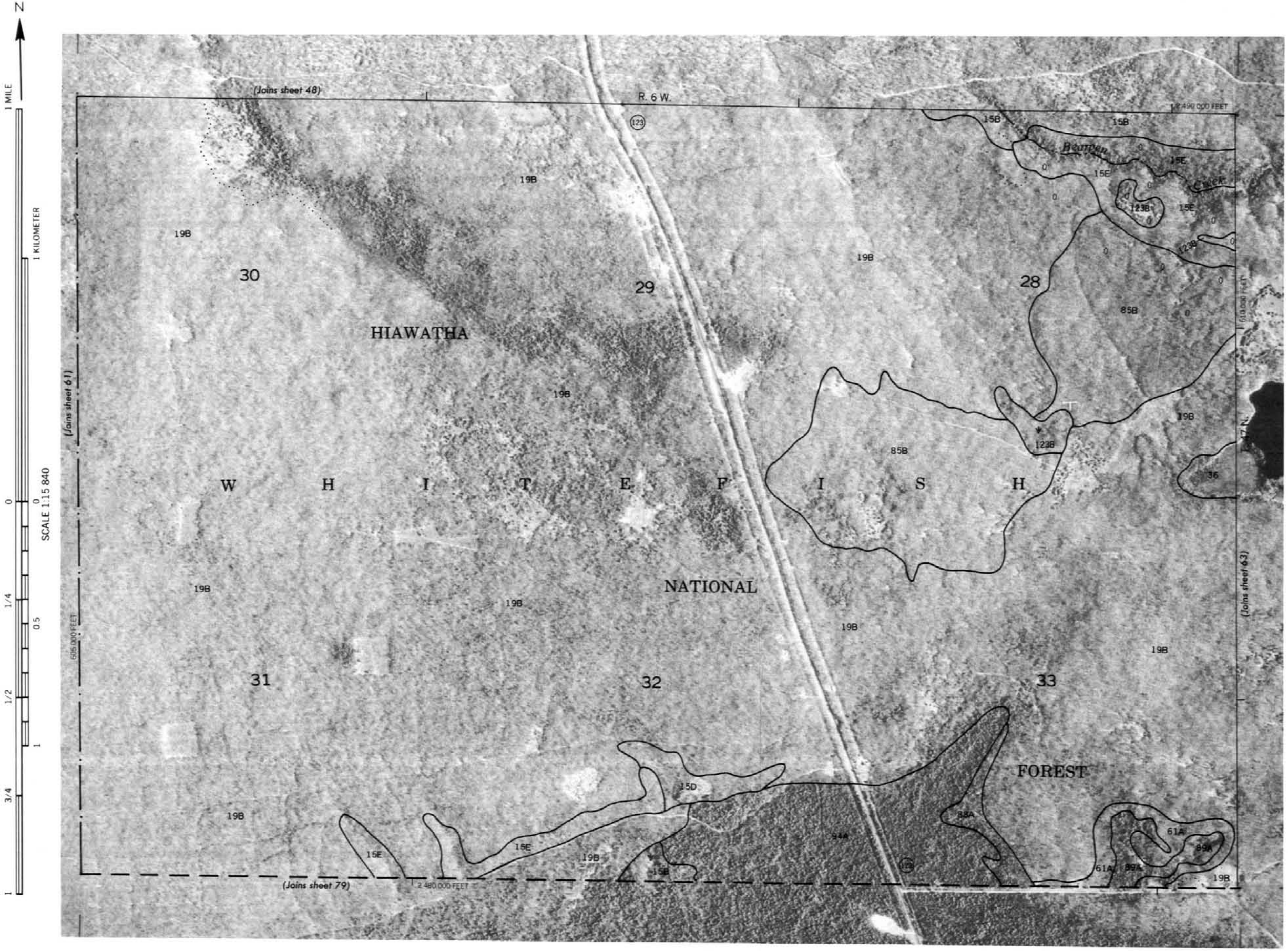
CHIPPEWA COUNTY, MICHIGAN NO. 60

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 61


N
R. 7 W.
T. 47 N.
2 460 000 FEET
640 000 FEET
605 000 FEET
2 475 000 FEET
(Joins sheet 47)
(Joins sheet 60)
(Joins sheet 62)
(Joins sheet 78)
WHITEFISH
Big Beaver Creek
25
26
27
34
35
36
36
48E
94A
119
143
145A
22
123B
19B
19D
19E
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

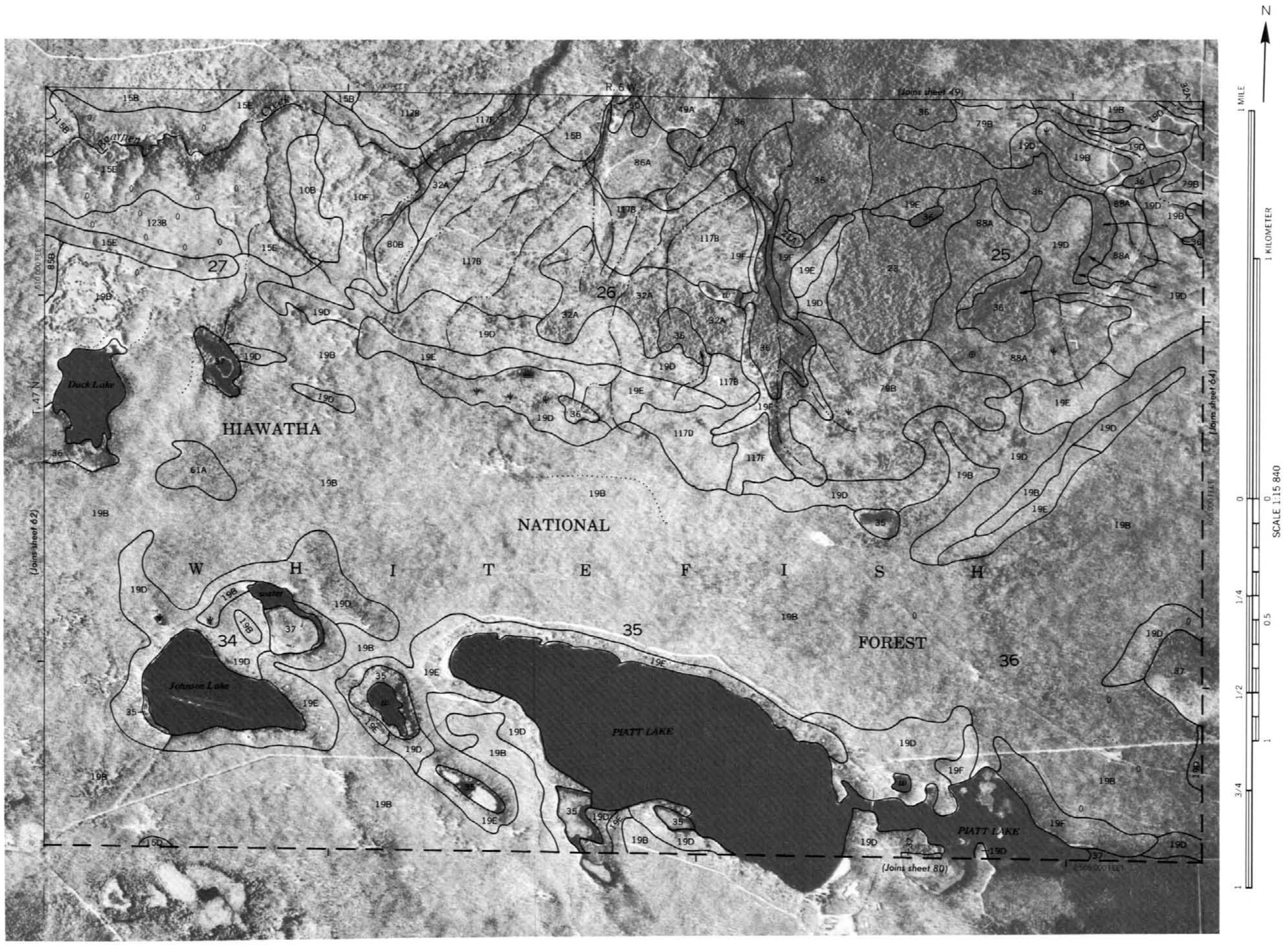

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 48)
R. 6 W.
123
2 490 000 FEET
(Joins sheet 61)
(Joins sheet 63)
(Joins sheet 79)
2 480 000 FEET
605 000 FEET
610 000 FEET
T. 47 N.
30
29
28
31
32
33
HIAWATHA
W H I T E F I S H
NATIONAL
FOREST
Beavers Creek
19B
15B
15E
123B
85B
36
15D
94A
88A
61A
89A
0

CHIPPEWA COUNTY, MICHIGAN NO. 62

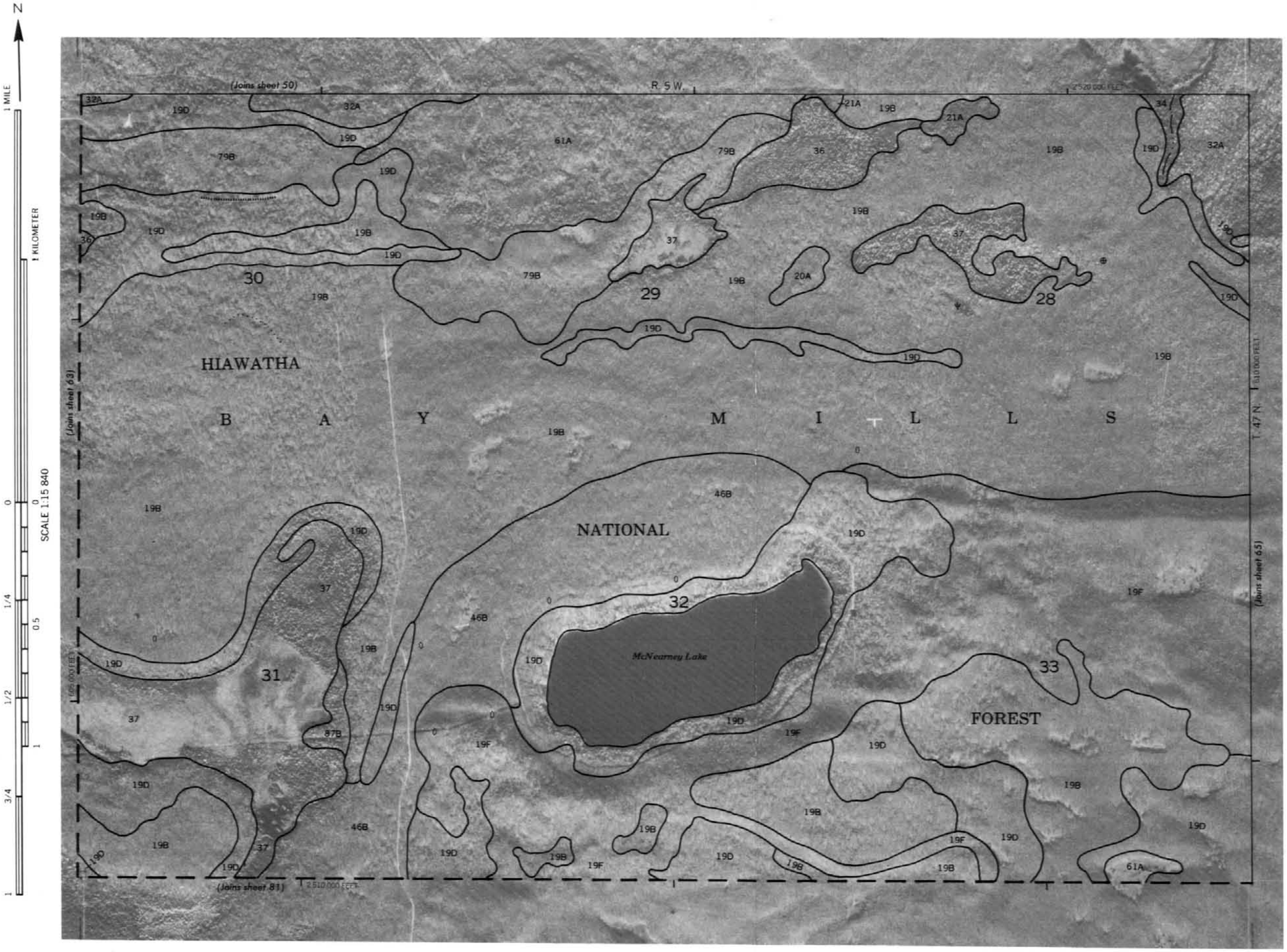
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 63


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
R. 6 W.
T. 47 N.
(Joins sheet 49)
(Joins sheet 62)
(Joins sheet 64)
(Joins sheet 80)
HIAWATHA
NATIONAL
W H I T E F I S H
FOREST
Duck Lake
Johnson Lake
PIATT LAKE
water
Beaver Creek
15B
15E
10B
10F
117B
117D
117F
123B
32A
80B
86A
88A
49A
79B
61A
85B
19B
19D
19E
19F
25
26
27
34
35
36
37
W

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 64

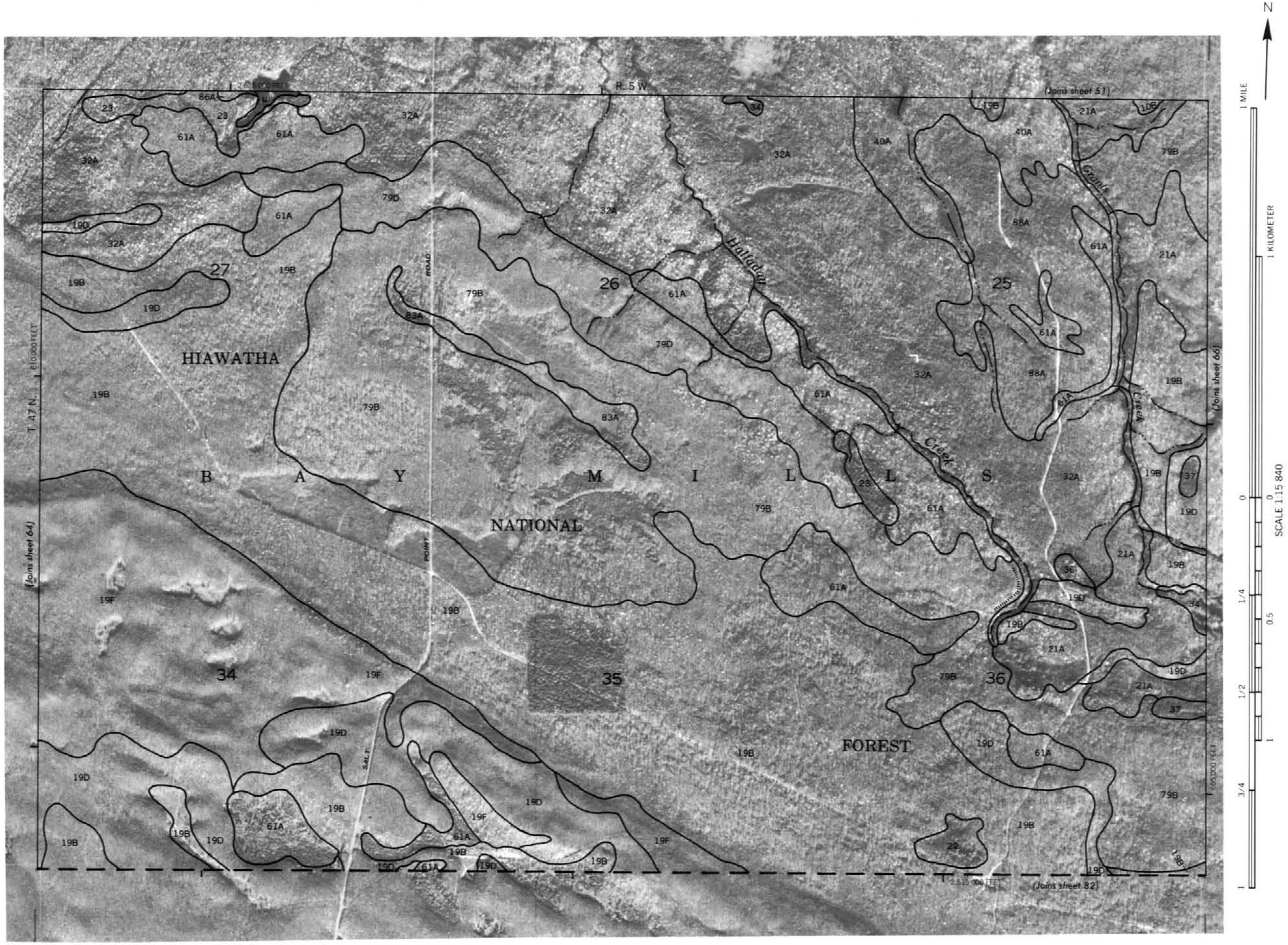

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
0.5
1/2
3/4
1
(Joins sheet 50)
R. 5 W.
2 520 000 FEET
(Joins sheet 63)
(Joins sheet 65)
(Joins sheet 81)
2 510 000 FEET
510 000 FEET
500 000 FEET
T. 47 N.
HIAWATHA
B A Y M I L L S
NATIONAL
FOREST
McNearney Lake
28
29
30
31
32
33
32A
19D
79B
19B
36
61A
21A
34
37
20A
46B
19F
87B
0

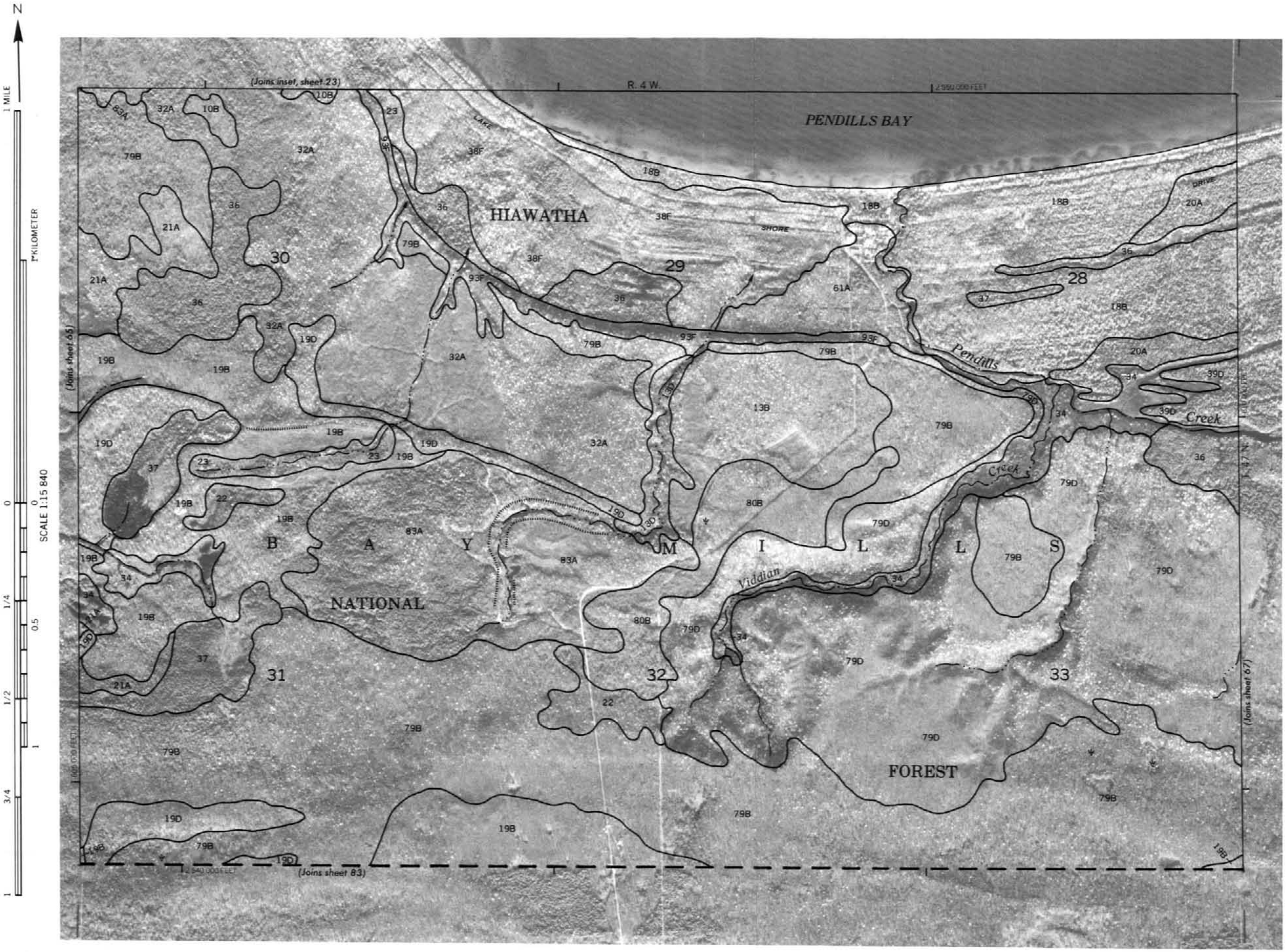
CHIPPEWA COUNTY, MICHIGAN NO. 64

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

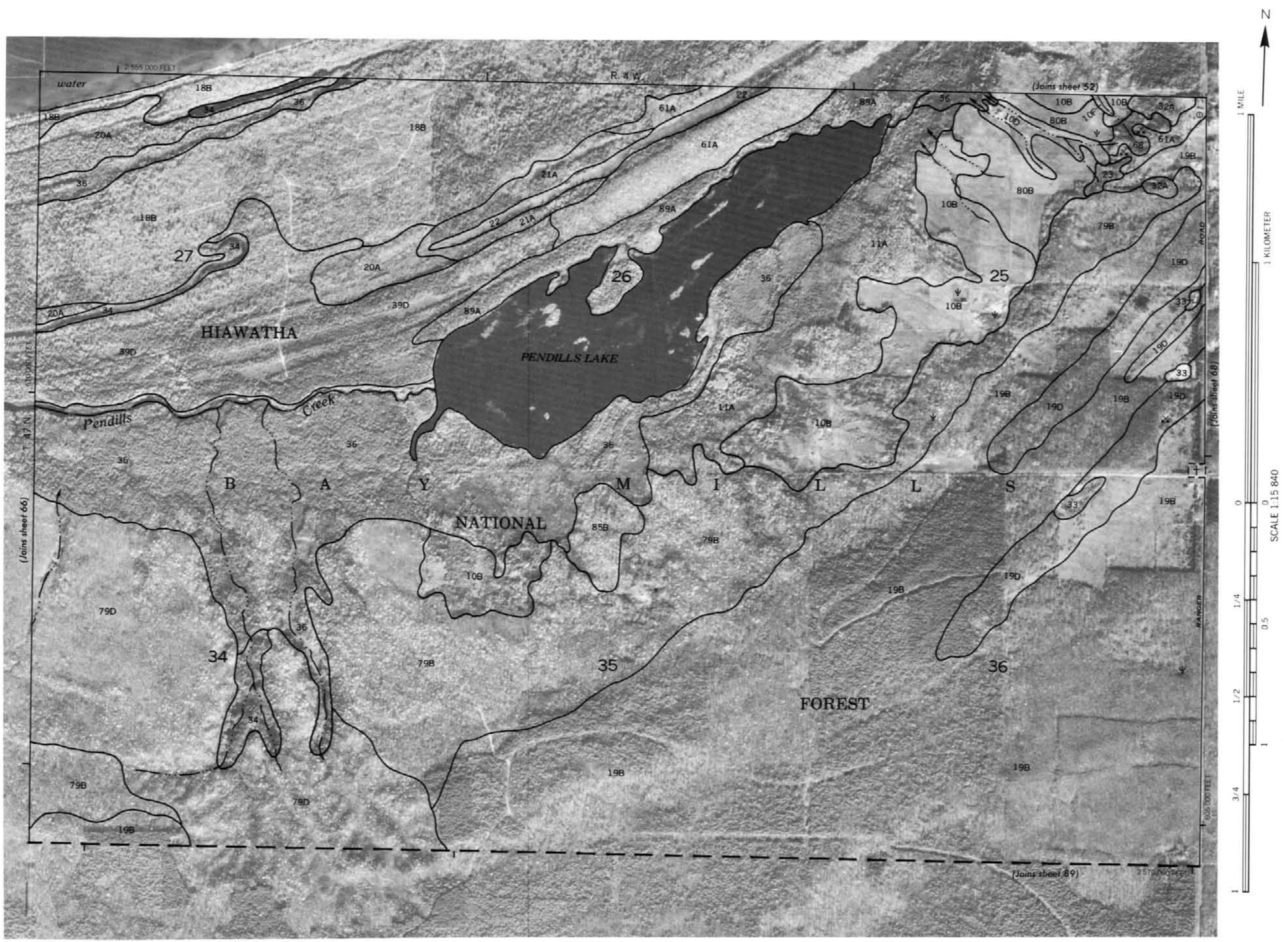
CHIPPEWA COUNTY, MICHIGAN NO. 65


N
R. 5 W.
T. 47 N.
(Joins sheet 51)
(Joins sheet 64)
(Joins sheet 66)
(Joins sheet 82)
2 335 000 FEET
610 000 FEET
595 000 FEET
HIAWATHA
B A Y M I L L S
NATIONAL
FOREST
POINT
ROAD
SALT
Halladay
Creek
Grants
Creek
27
26
25
34
35
36
23
86A
32A
61A
19D
19B
79D
79B
83A
40A
88A
21A
10B
37
36
34
19F
22
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
(Joins inset, sheet 23)
R. 4 W.
2 550 000 FEET
PENDILLS BAY
LAKE
SHORE
DRIVE
HIAWATHA
NATIONAL
FOREST
B A Y M I L L S
Pendills Creek
Viddian Creek
(Joins sheet 65)
(Joins sheet 67)
(Joins sheet 83)
T. 47 N.
30
29
28
31
32
33
83A
32A
10B
79B
36
21A
38F
18B
20A
37
61A
93F
13B
79D
39D
34
19B
19D
23
22
80B

CHIPPEWA COUNTY, MICHIGAN NO. 66

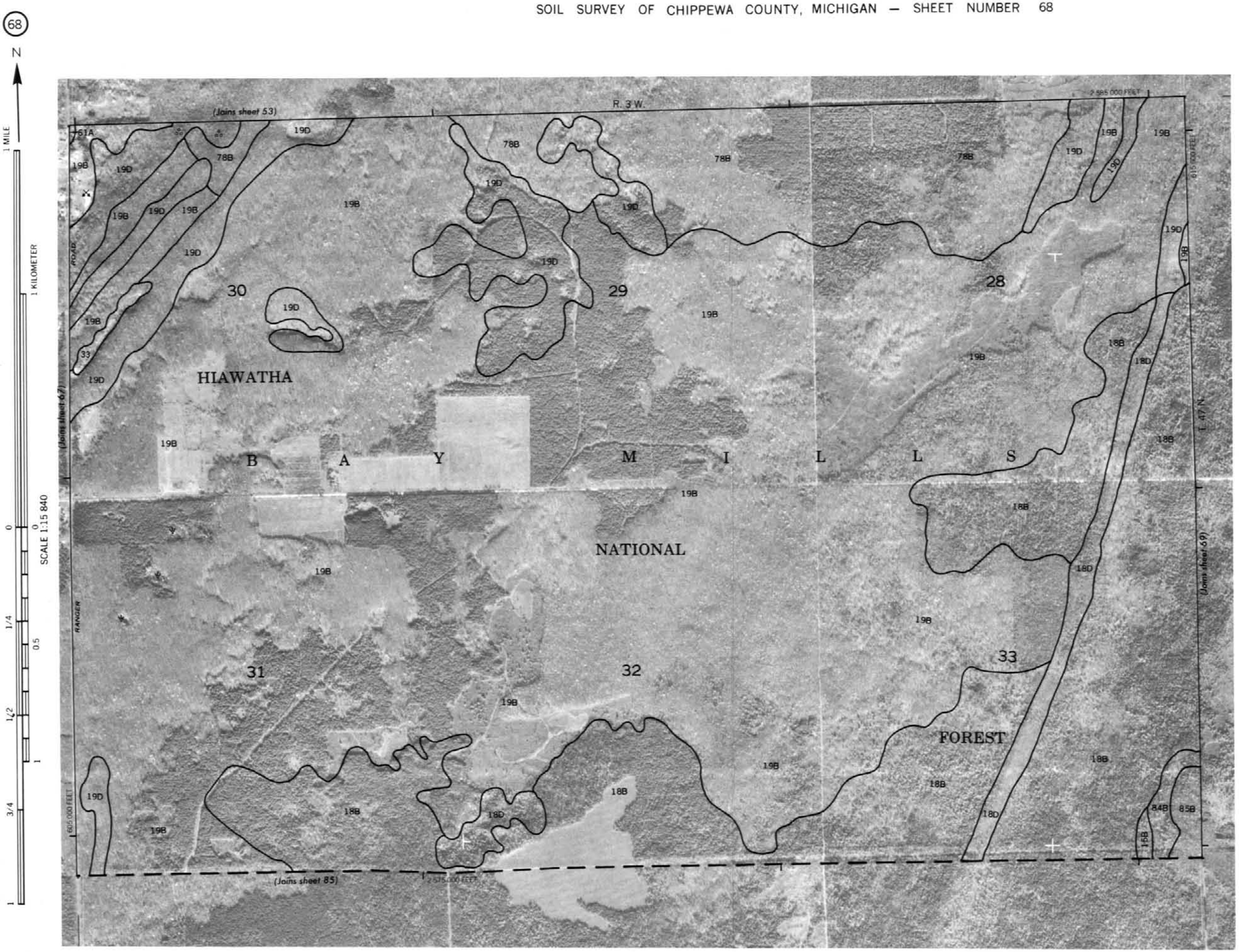
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
water
2 555 000 FEET
R. 4 W.
(Joins sheet 52)
(Joins sheet 66)
(Joins sheet 68)
(Joins sheet 69)
T. 47 N.
HIAWATHA
BAY
MILLS
NATIONAL
FOREST
PENDILLS LAKE
Pendills
Creek
ROAD
RANGER
18B
20A
34
36
27
39D
21A
22
61A
89A
26
11A
36
10B
80B
10D
10F
32A
61A
58
23
19B
79B
19D
33
25
85B
79D
35
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 67

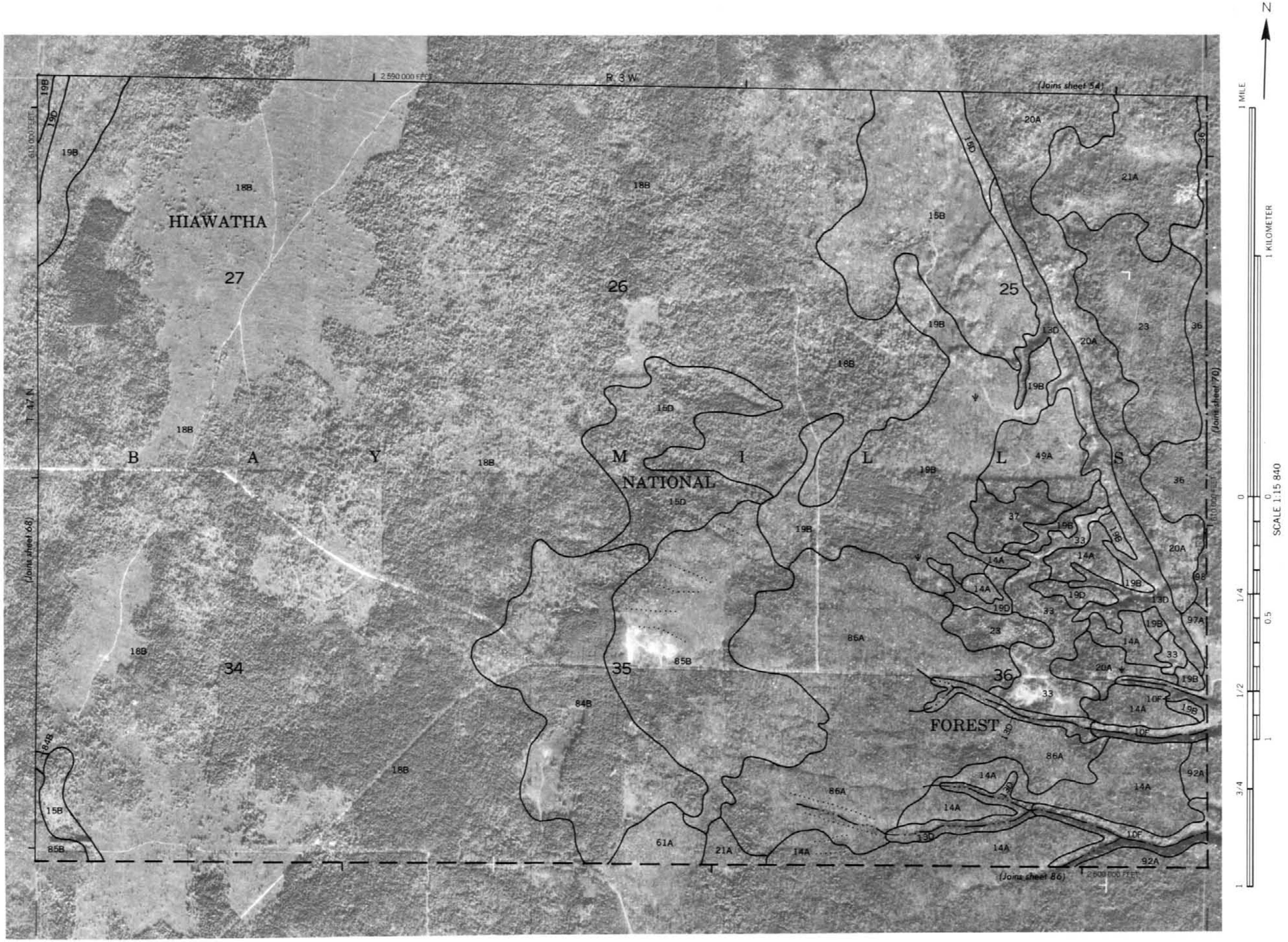
SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 68



68
N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
SCALE 1:15 840
R. 3 W.
2 585 000 FEET
(Joins sheet 53)
(Joins sheet 67)
(Joins sheet 69)
(Joins sheet 85)
2 575 000 FEET
615 000 FEET
605 000 FEET
T. 47 N.
ROAD
RANGER
61A
19B
19D
78B
33
30
29
28
31
32
33
HIAWATHA
B A Y M I L L S
NATIONAL
FOREST
18B
18D
16B
84B
85B

CHIPPEWA COUNTY, MICHIGAN NO. 68

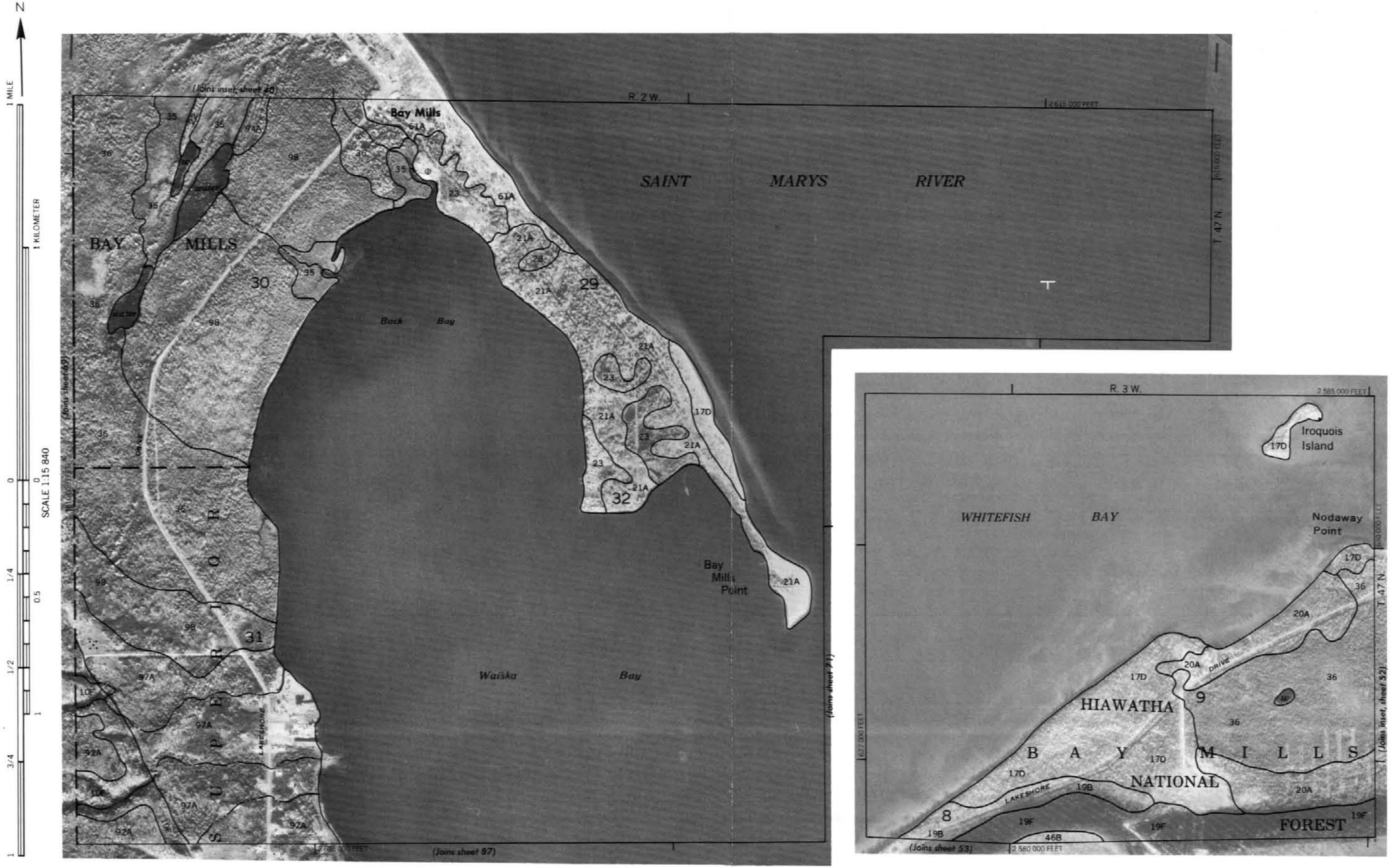
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
HIAWATHA
BAY MILLS
NATIONAL
FOREST
27
26
25
34
35
36
R. 3 W.
T. 47 N.
2 590 000 FEET
2 600 000 FEET
510 000 FEET
(Joins sheet 54)
(Joins sheet 68)
(Joins sheet 70)
(Joins sheet 86)
19B
19D
18B
15B
15D
13D
20A
21A
23
36
49A
37
33
14A
19D
86A
85B
84B
61A
10F
92A
97A
98
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 69

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 70


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins inset, sheet 40)
R. 2 W.
2 615 000 FEET
615 000 FEET
T. 47 N.
Bay Mills
SAINT
MARYS
RIVER
BAY
MILLS
30
29
Back
Bay
Waiska
Bay
Bay
Mills
Point
32
31
SUPERIOR
LAKESHORE
(Joins sheet 69)
(Joins sheet 71)
(Joins sheet 87)
2 605 000 FEET
35
36
94A
98
61A
23
21A
28
17D
97A
10F
92A
water
R. 3 W.
2 585 000 FEET
Iroquois
Island
WHITEFISH
BAY
Nodaway
Point
630 000 FEET
627 000 FEET
T. 47 N.
(Joins inset, sheet 52)
20A
DRIVE
9
HIAWATHA
BAY
MILLS
NATIONAL
FOREST
8
19B
19F
46B
LAKESHORE
(Joins sheet 53)
2 580 000 FEET

3000 AND 5000-FOOT GRID TICKS

CHIPPEWA COUNTY, MICHIGAN NO. 70

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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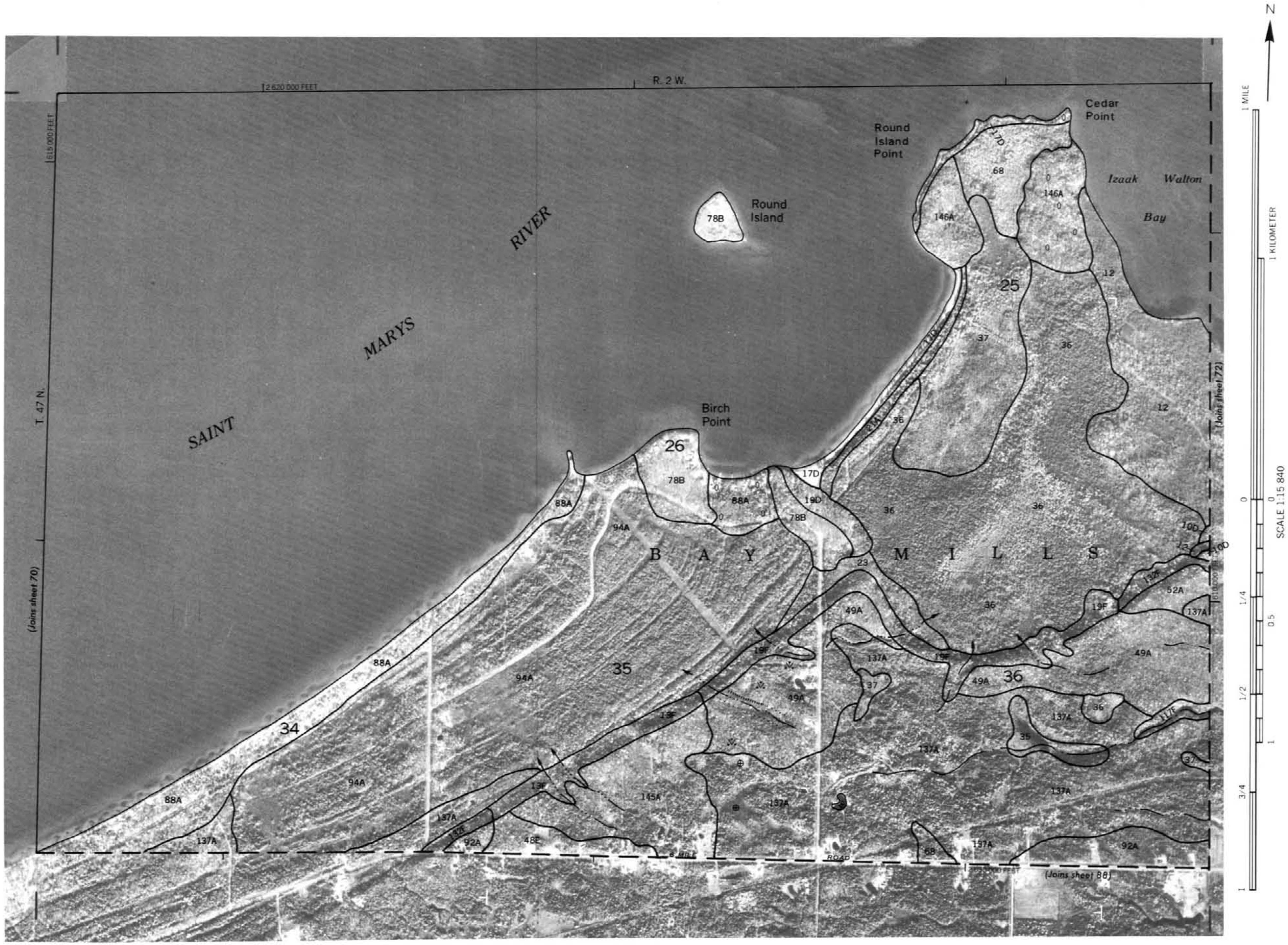
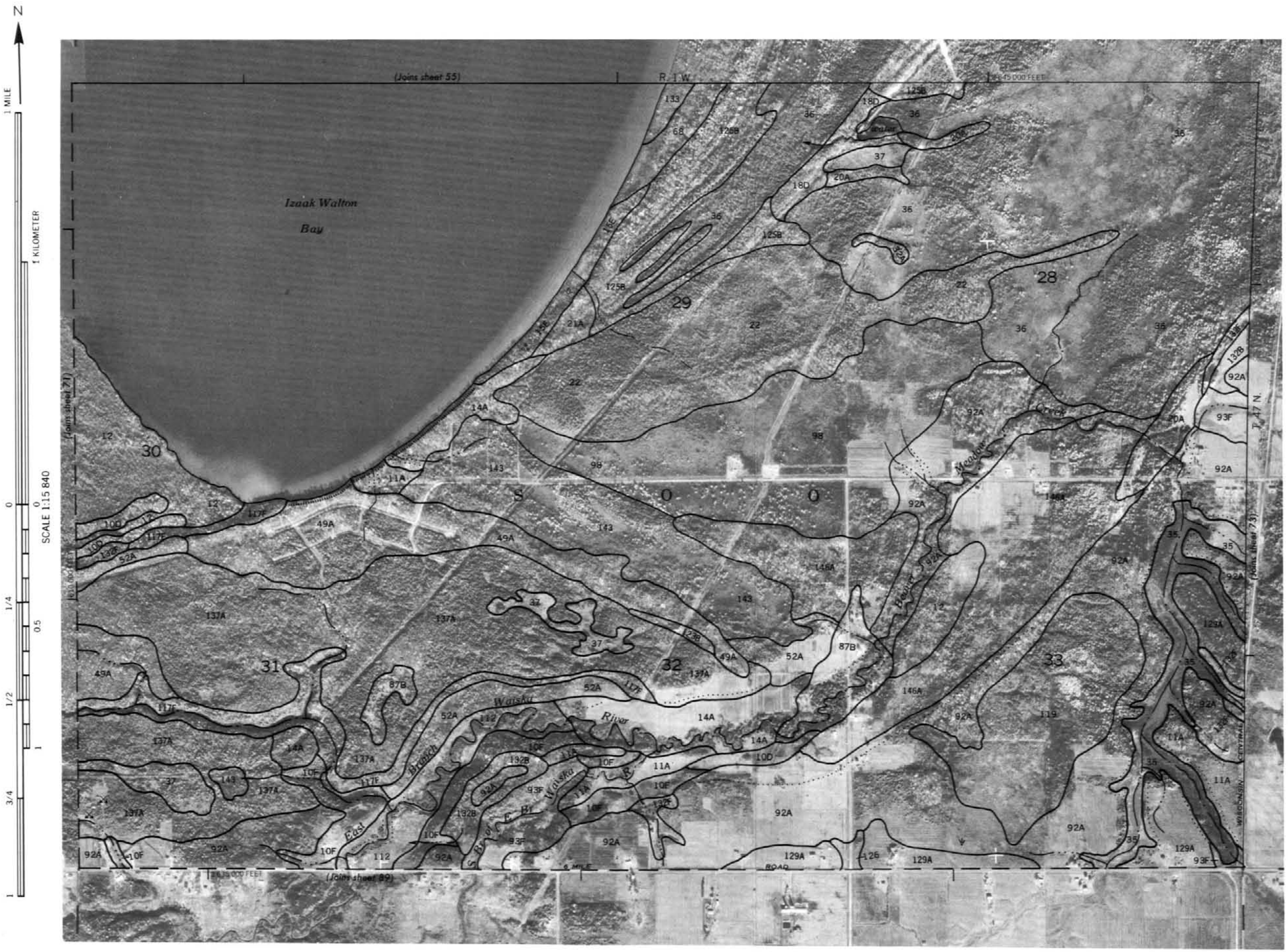
CHIPPEWA COUNTY, MICHIGAN NO. 71


N
2 620 000 FEET
R. 2 W.
619 000 FEET
T. 47 N.
(Joins sheet 70)
(Joins sheet 72)
(Joins sheet 86)
SAINT MARYS RIVER
Round Island
78B
Round Island Point
Cedar Point
Izaak Walton Bay
Birch Point
BAY MILLS
ROAD
17D
68
146A
0
25
12
37
36
26
78B
88A
19D
94A
35
34
23
49A
19F
137A
13F
145A
48E
92A
10D
52A
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

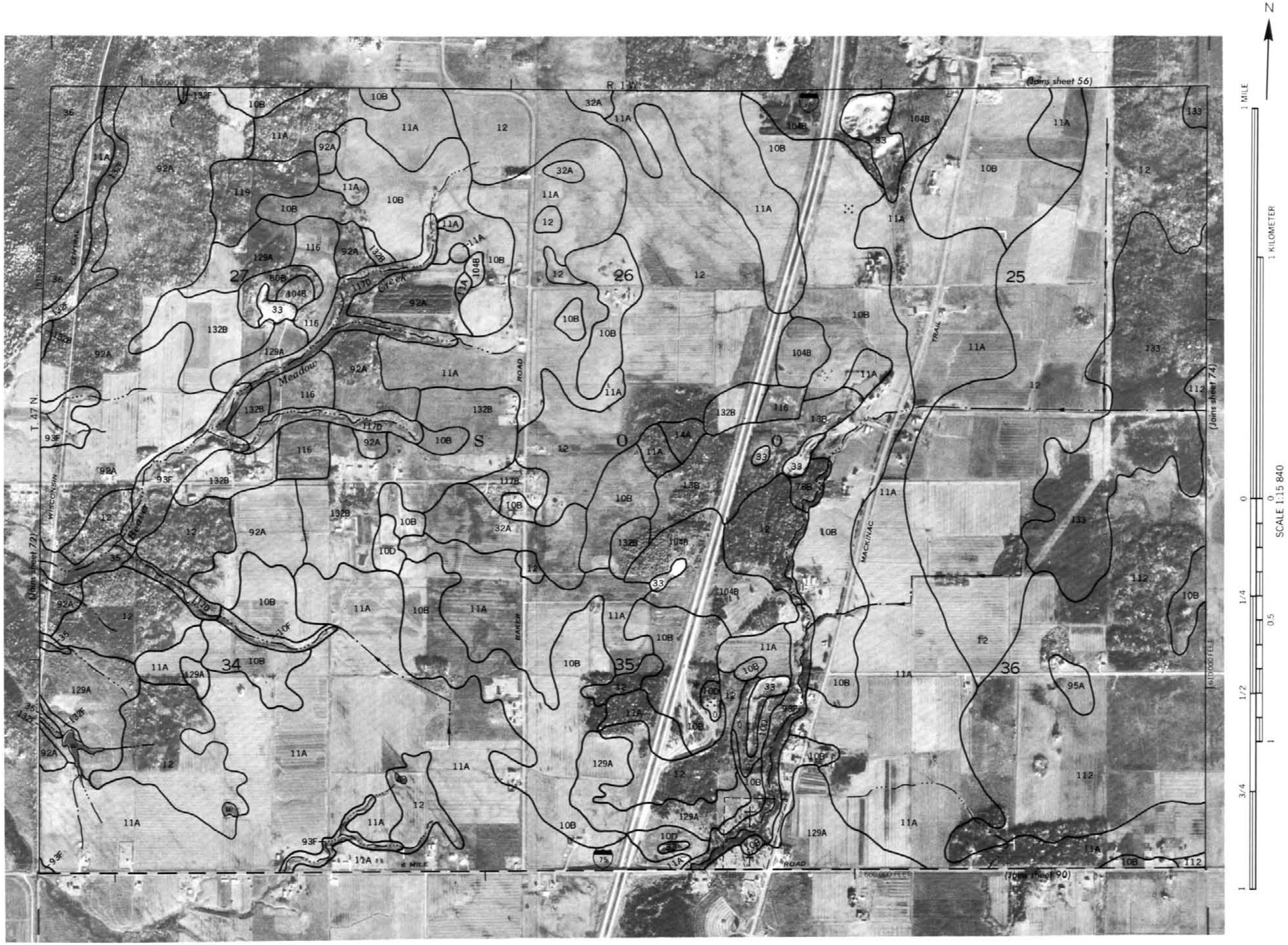
SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 72


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
(Joins sheet 55)
R. 1 W.
(Joins sheet 71)
(Joins sheet 73)
(Joins sheet 89)
T. 47 N.
Izaak Walton Bay
Waiska River
East Branch
E. Br. Waiska R.
Meadow
6 MILE
ROAD
WISCONSIN CENTRAL
28
29
30
31
32
33
133
68
125B
36
18D
37
20A
22
21A
14A
98
143
11A
12
117F
10D
132B
52A
49A
137A
87B
146A
92A
93F
35
129A
119
10F
112
126
11A

CHIPPEWA COUNTY, MICHIGAN NO. 72

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

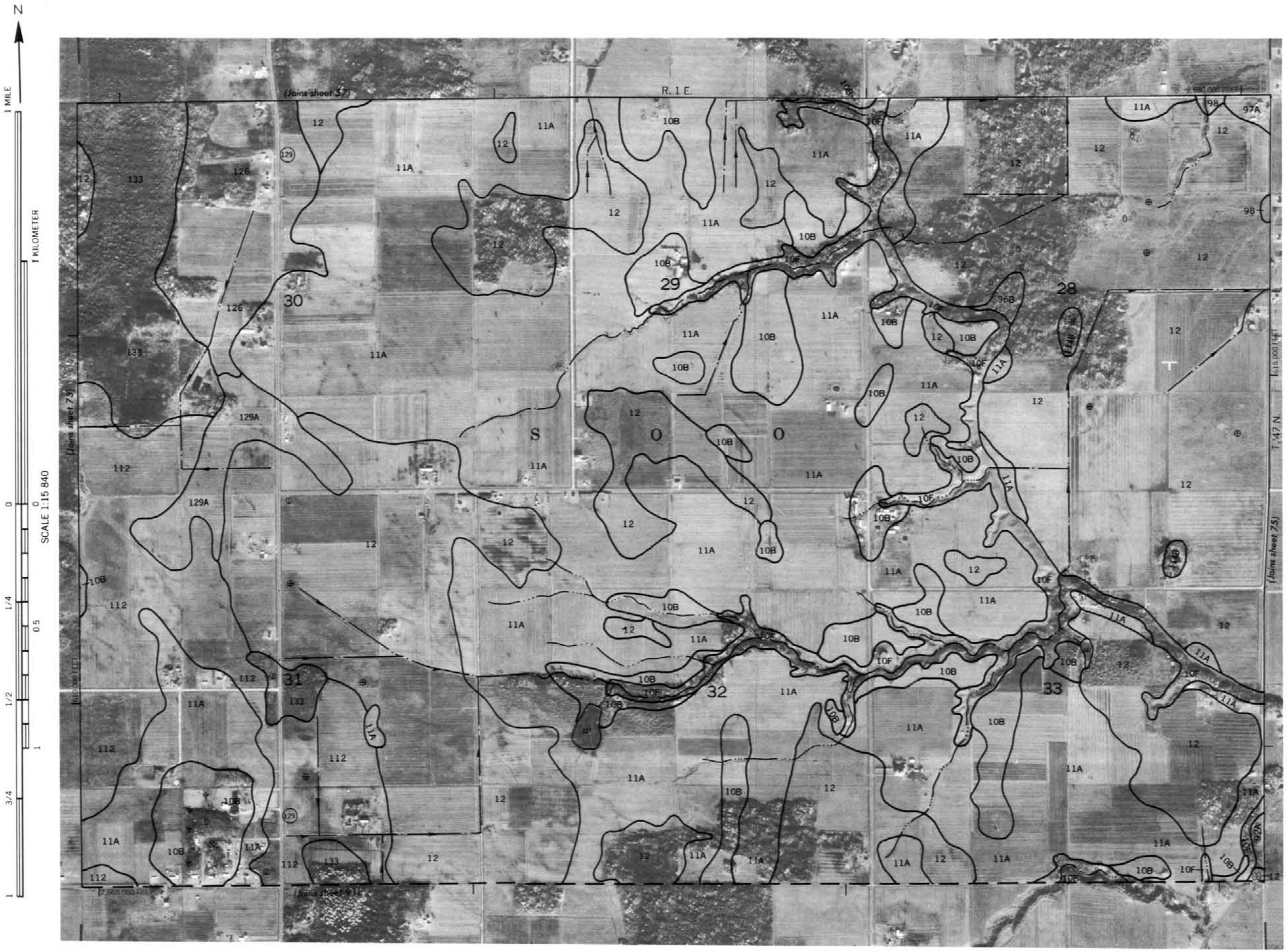
SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 73


73
N
R 1 W
T 47 N
(Joins sheet 56)
(Joins sheet 74)
(Joins sheet 90)
(Joins sheet 72)
2 650 000 FEET
2 660 000 FEET
610 000 FEET
25
26
27
34
35
36
S
O
O
CENTRAL
WISCONSIN
Meadow
Creek
Beaver
BAKER
ROAD
MACKINAC
TRAIL
6 MILE
ROAD
75
11A
10B
12
92A
132B
116
117D
129A
104B
33
32A
133
112
13B
10D
95A
93F
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 73

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 74


N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
SCALE 1:15 840
R. 1 E.
T. 47 N.
(Joins sheet 57)
(Joins sheet 73)
(Joins sheet 75)
(Joins sheet 91)
29
30
31
32
33
28
S
O
O
129
11A
12
10B
10F
133
126
129A
112
96B
97A
98
92A
114B

CHIPPEWA COUNTY, MICHIGAN NO. 74

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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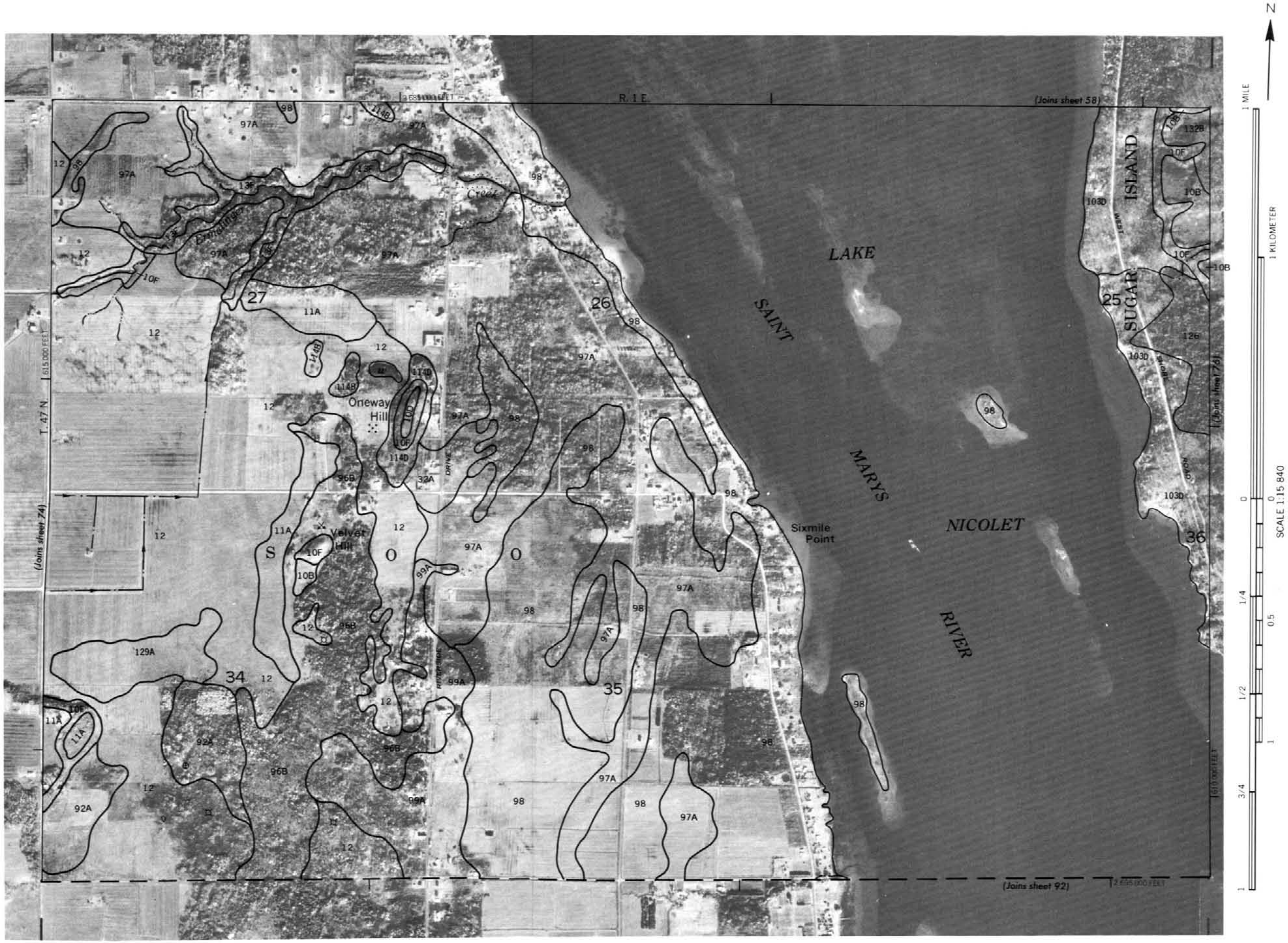
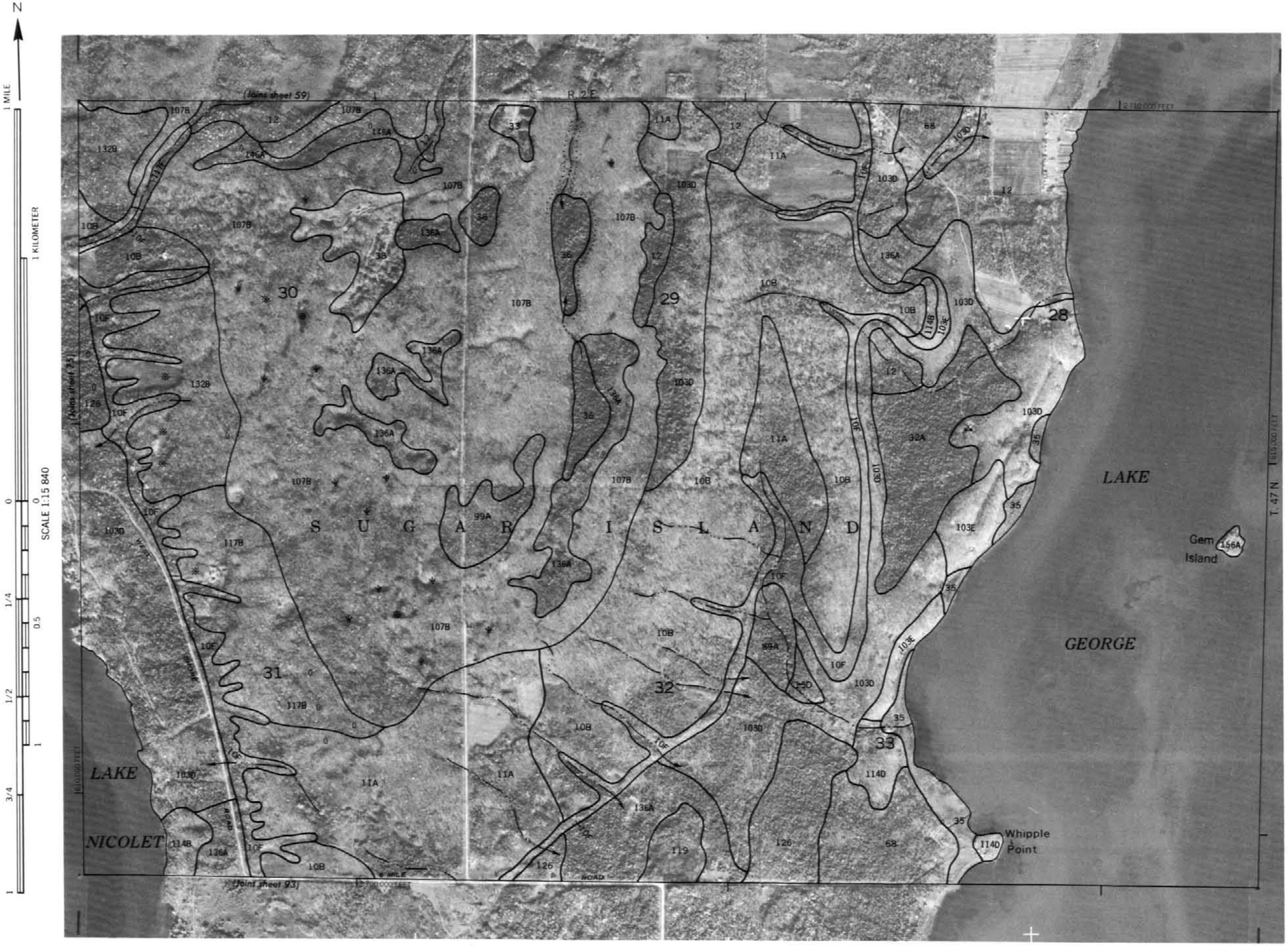
CHIPPEWA COUNTY, MICHIGAN NO. 75

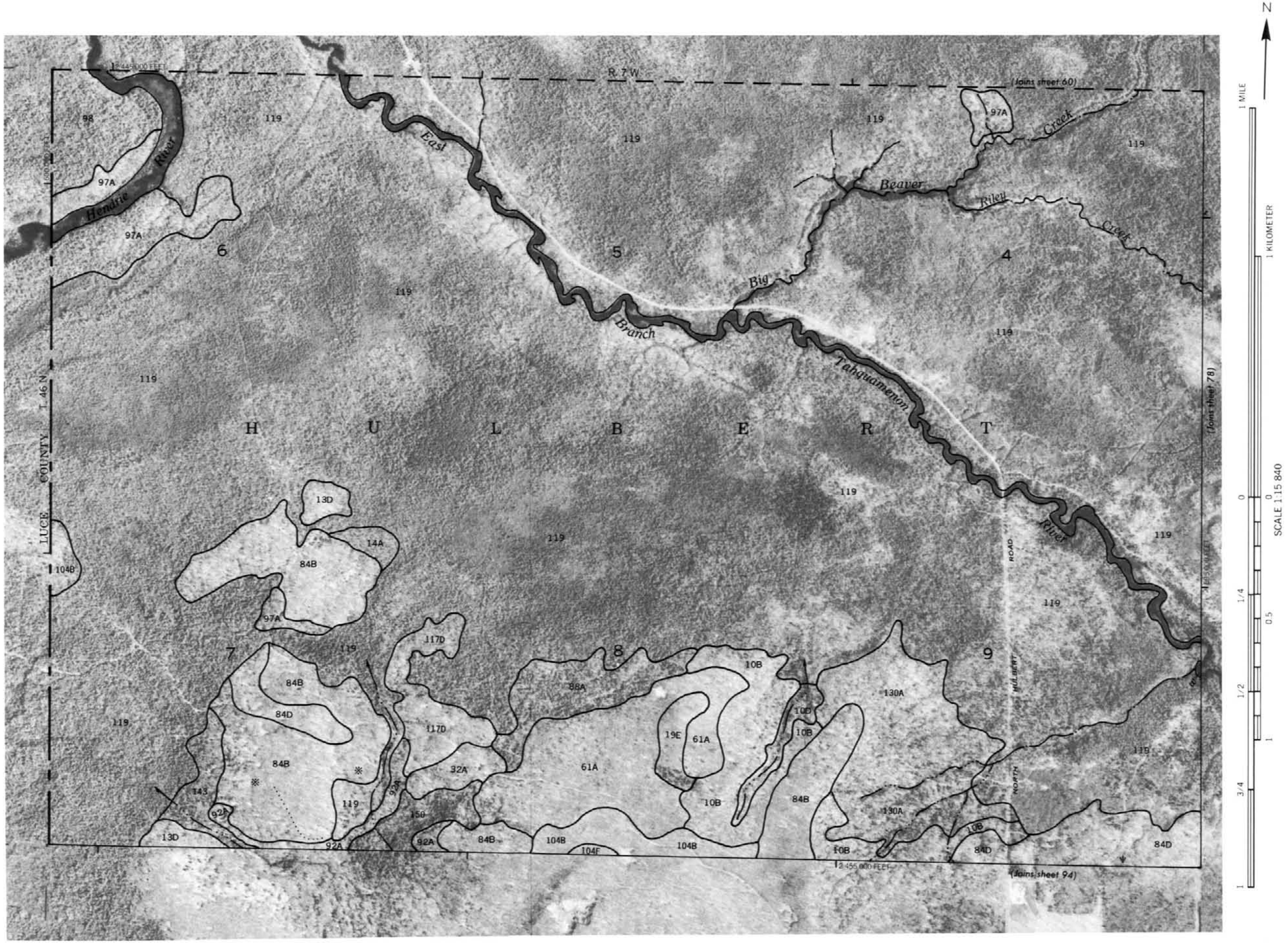

N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
SCALE 1:15 840
R. 1 E.
T. 47 N.
(Joins sheet 58)
(Joins sheet 74)
(Joins sheet 76)
(Joins sheet 92)
615 000 FEET
2 695 000 FEET
LAKE
SAINT
MARYS
NICOLET
RIVER
SUGAR
ISLAND
Sixmile Point
Oneway Hill
Velvet Hill
Creek
DRIVE
RIVERSIDE
WEST
SHORE
ROAD
S
O
O
25
26
27
34
35
36
97A
98
12
13F
10F
11A
114B
114D
10D
10B
32A
96B
99A
129A
92A
103D
132B
126

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 76


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 59)
(Joins sheet 75)
(Joins sheet 93)
R. 2 E.
T. 47 N.
2 710 000 FEET
615 000 FEET
610 000 FEET
S U G A R   I S L A N D
LAKE GEORGE
LAKE NICOLET
Gem Island
Whipple Point
28
29
30
31
32
33
10B
10F
11A
12
32A
33
35
36
68
99A
103D
103E
107B
114B
114D
117B
119
126
132B
136A
146A
156A
ROAD

CHIPPEWA COUNTY, MICHIGAN NO. 76

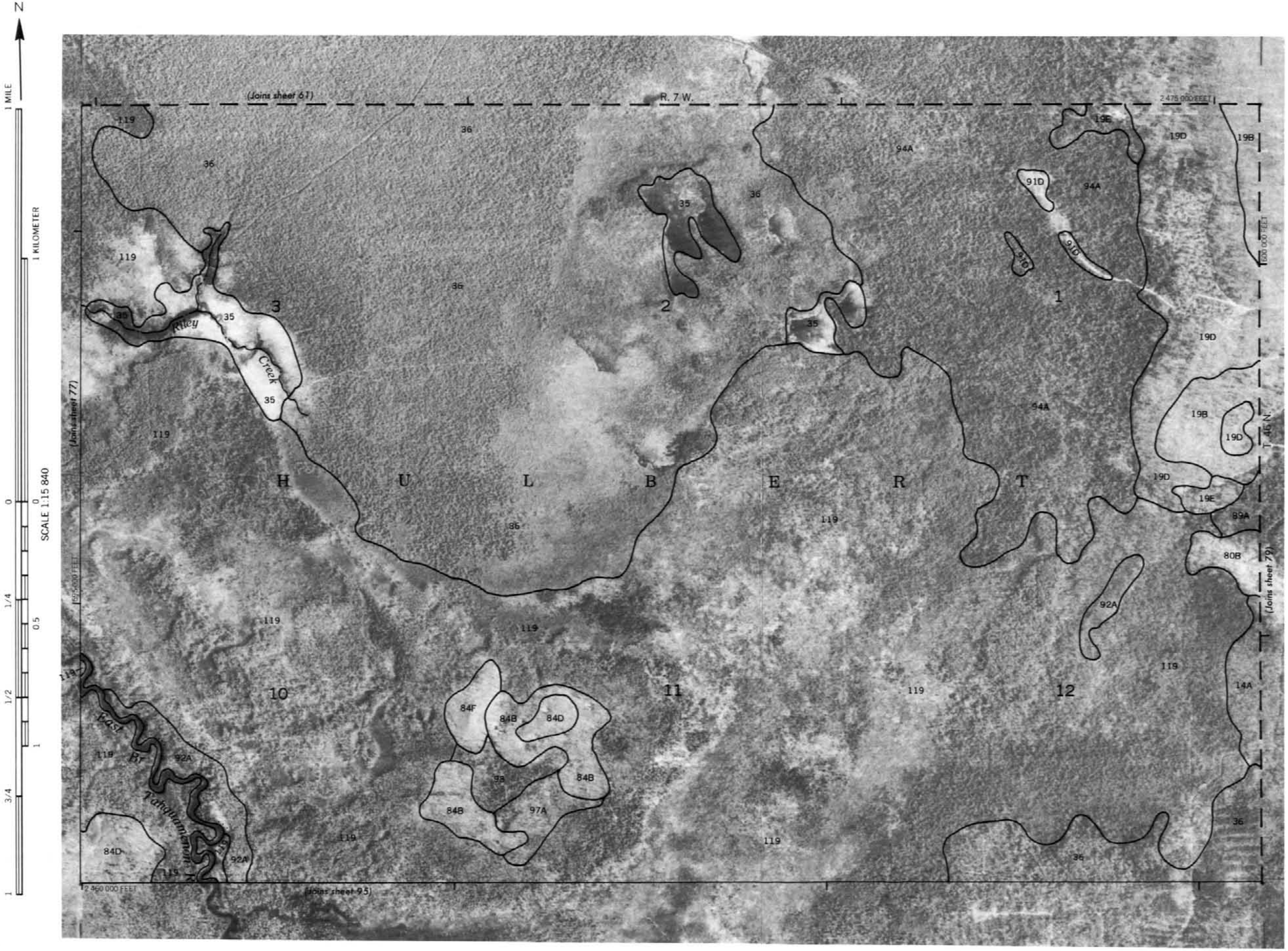
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
R. 7 W.
(Joins sheet 60)
(Joins sheet 78)
(Joins sheet 94)
2 456 000 FEET
T. 46 N.
LUCE COUNTY
H U L B E R T
Hendrie River
East Branch
Big
Tahquamenon River
Beaver Creek
Riley Creek
HULBERT NORTH ROAD
6
5
4
7
8
9
98
97A
119
13D
14A
84B
84D
104B
104F
117D
88A
10B
10D
130A
19E
61A
32A
92A
143
150
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

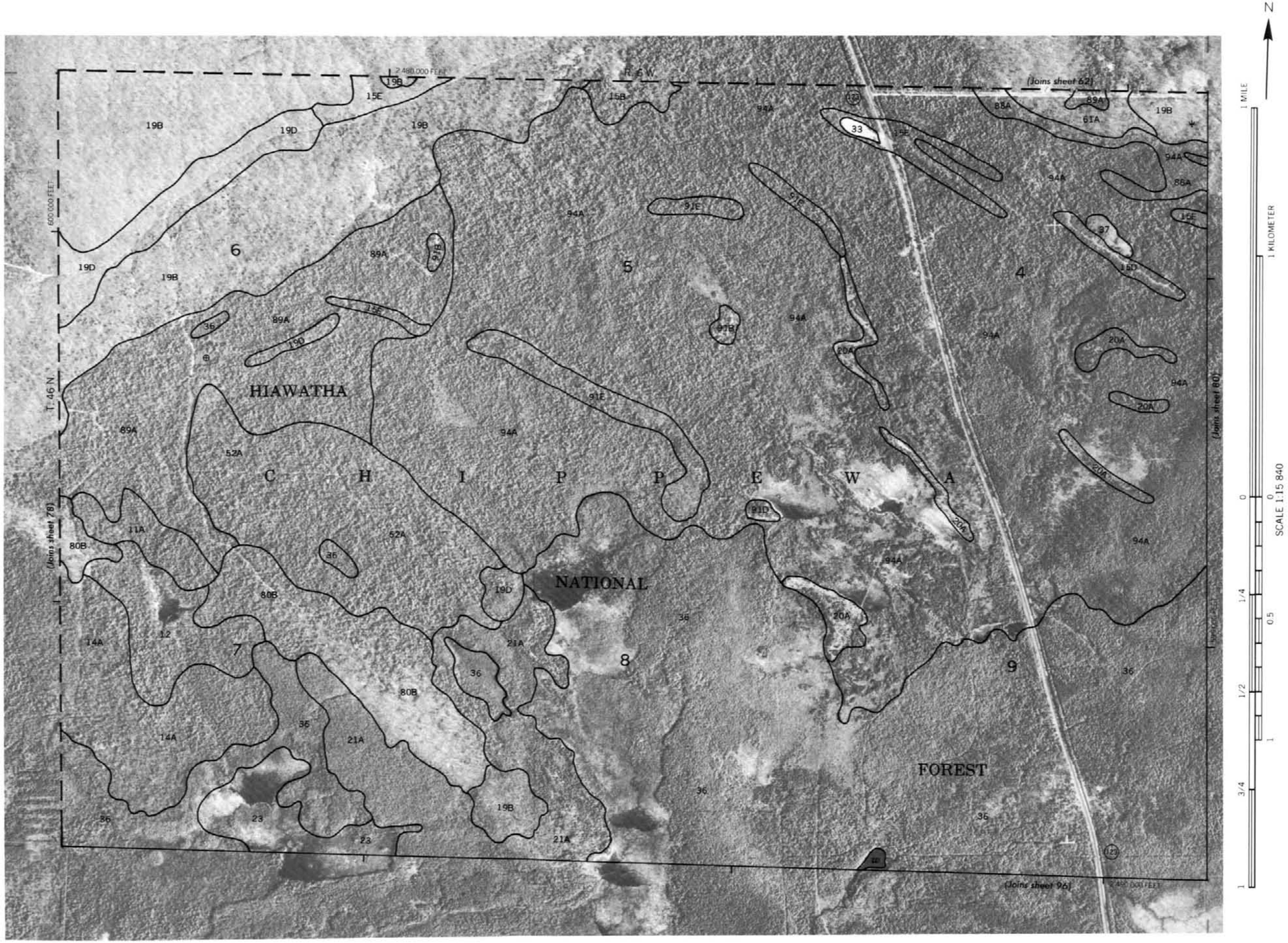
CHIPPEWA COUNTY, MICHIGAN NO. 77

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 78


N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
SCALE 1:15 840
(Joins sheet 61)
R. 7 W.
2 475 000 FEET
(Joins sheet 77)
(Joins sheet 79)
(Joins sheet 95)
T. 45 N.
600 000 FEET
570 000 FEET
2 460 000 FEET
H U L B E R T
1
2
3
10
11
12
Riley Creek
East Br Tahquamenon R
119
36
35
94A
19E
19D
19B
91D
80B
89A
92A
14A
84F
84B
84D
98
97A

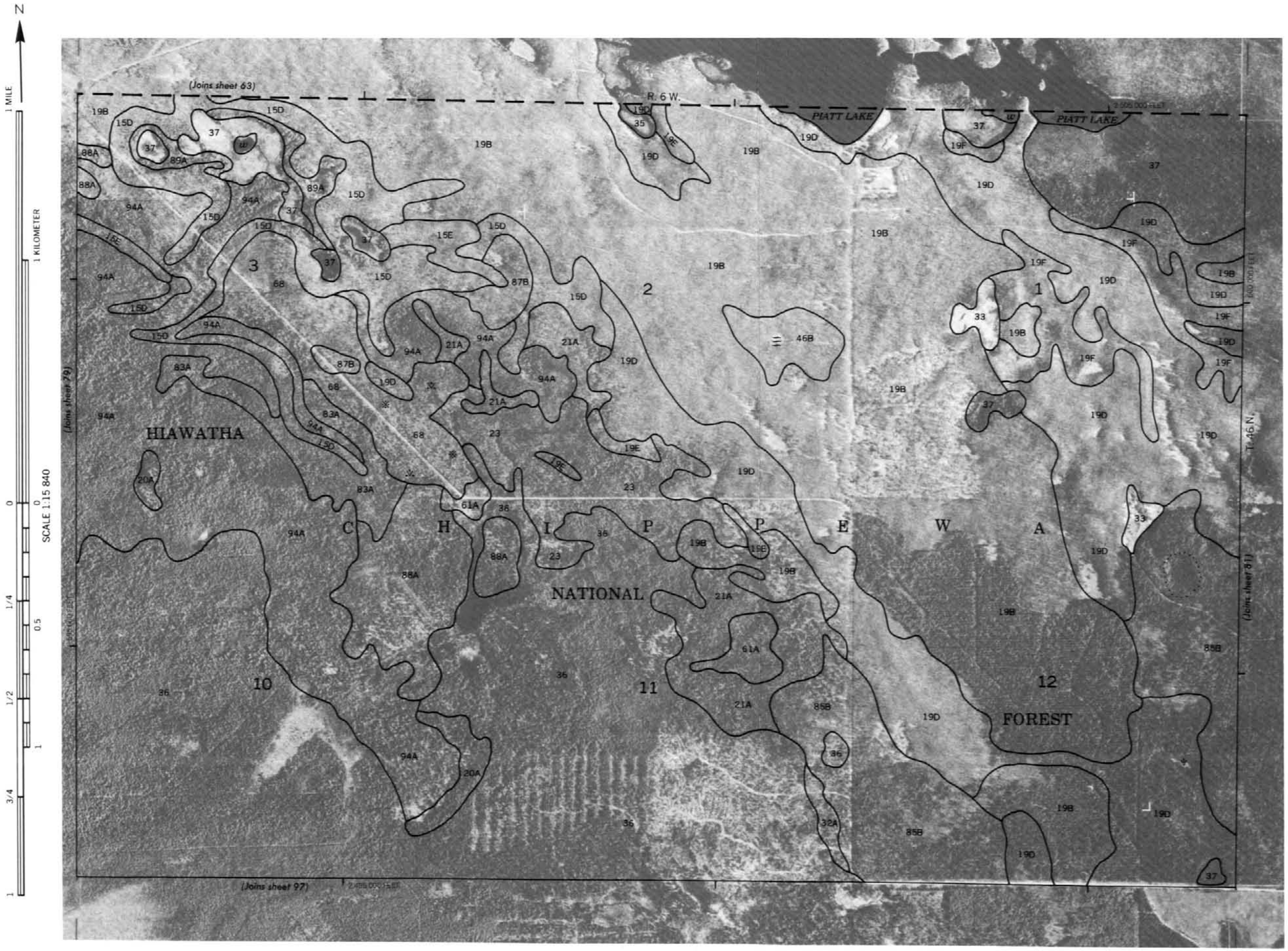
CHIPPEWA COUNTY, MICHIGAN NO. 78

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
2 480 000 FEET
R. 5 W.
(Joins sheet 62)
600 000 FEET
T. 46 N.
(Joins sheet 78)
(Joins sheet 80)
(Joins sheet 96)
HIAWATHA
C H I P P E W A
NATIONAL
FOREST
6
5
4
7
8
9
123
19B
15E
19D
15B
94A
33
88A
89A
61A
94A
86A
91E
91B
37
16D
36
89A
20A
52A
11A
80B
14A
12
19D
21A
23
91D
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

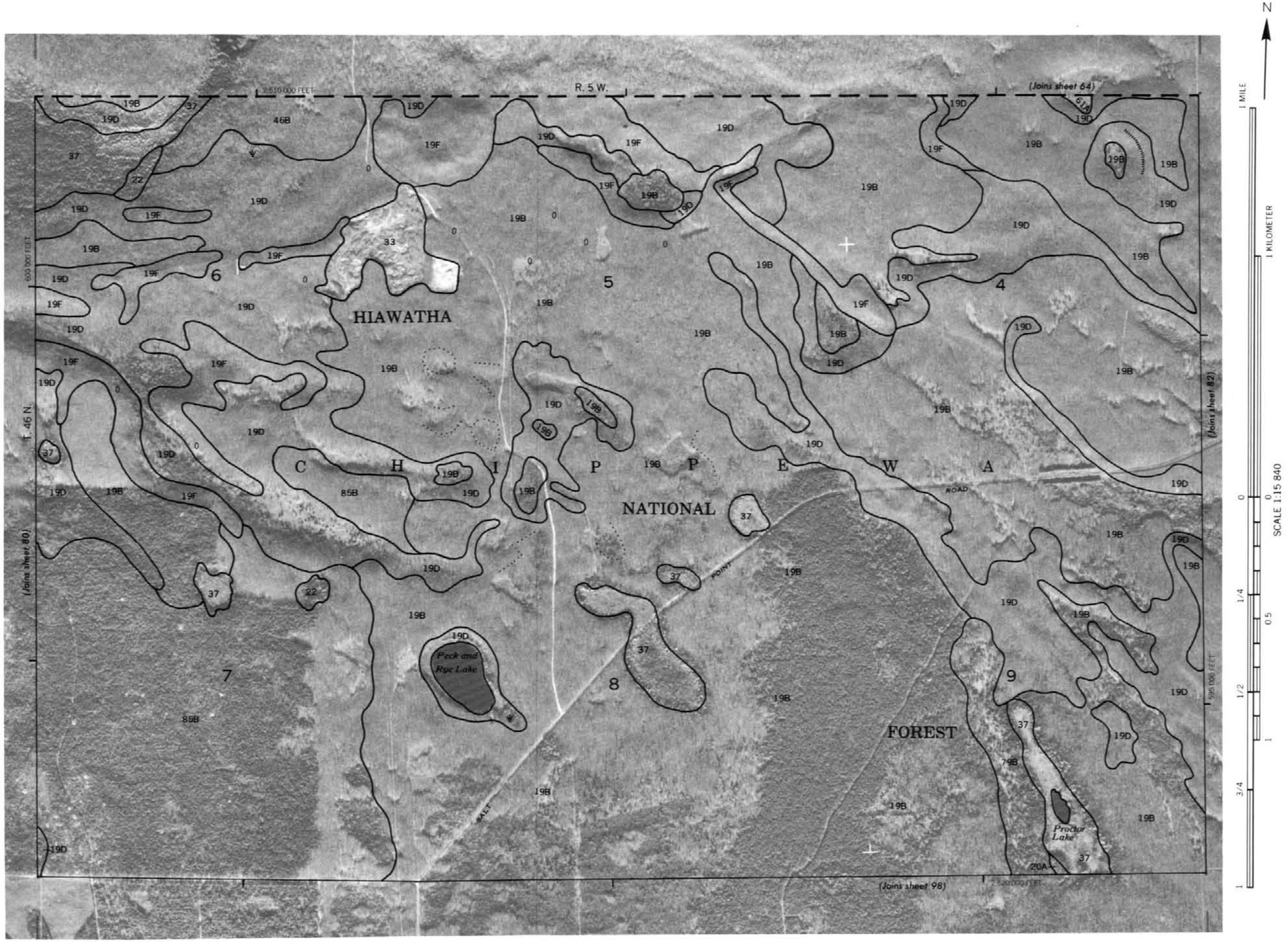
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 79


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
(Joins sheet 63)
(Joins sheet 79)
(Joins sheet 81)
(Joins sheet 97)
R. 6 W.
T. 46 N.
PIATT LAKE
HIAWATHA
CHIPPEWA
NATIONAL
FOREST
1
2
3
10
11
12
19B
15D
15E
19D
19E
19F
35
37
33
46B
87B
88A
89A
94A
21A
61A
68
83A
20A
23
36
32A
85B

CHIPPEWA COUNTY, MICHIGAN NO. 80

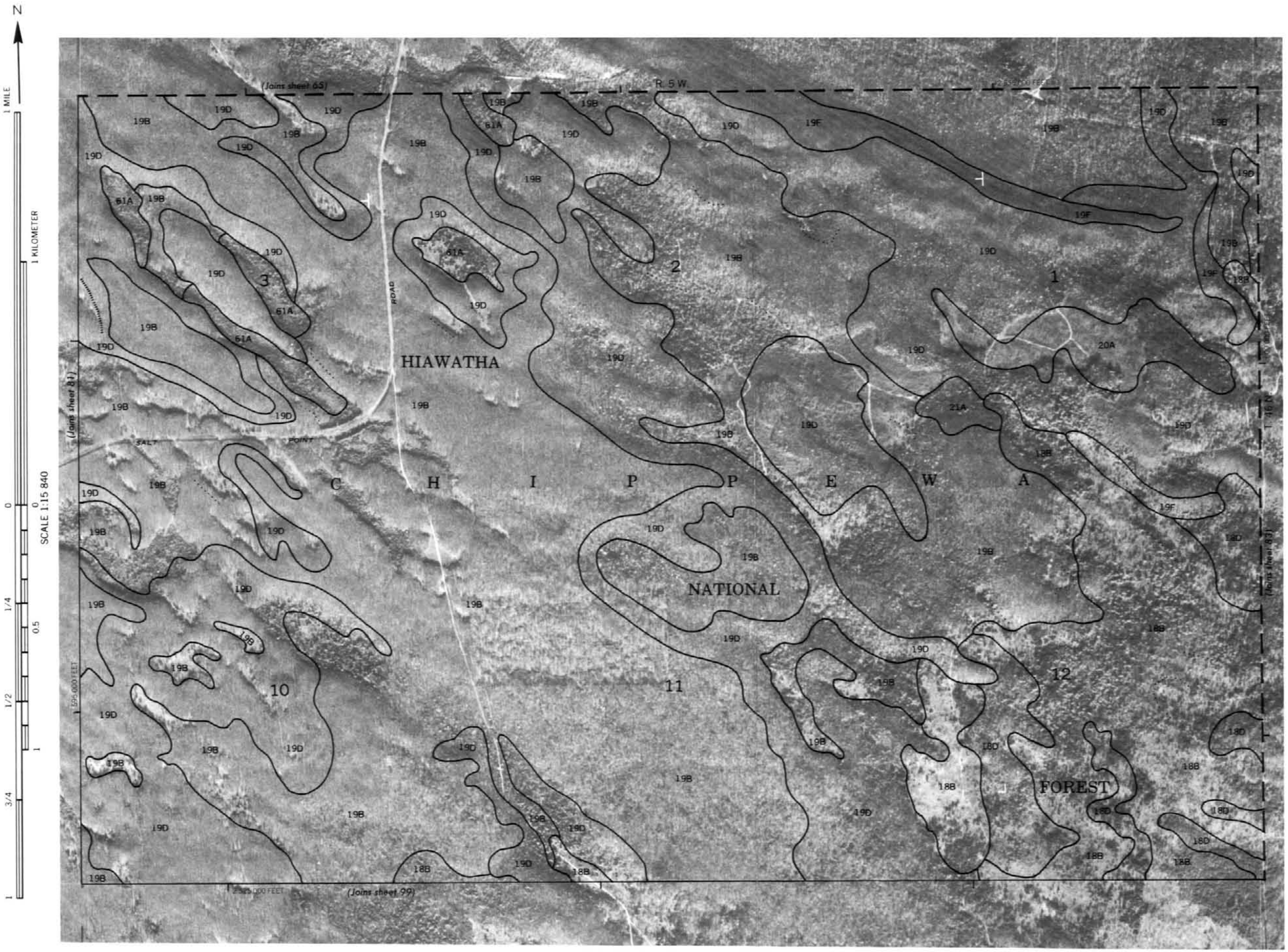
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
(Joins sheet 64)
R. 5 W.
2 510 000 FEET
T. 46 N.
600 000 FEET
(Joins sheet 80)
(Joins sheet 82)
(Joins sheet 98)
2 520 000 FEET
595 000 FEET
HIAWATHA
CHIPPEWA
NATIONAL
FOREST
ROAD
SALT POINT
Peck and Rye Lake
Proctor Lake
6
5
4
7
8
9
19B
19D
19F
37
46B
22
33
85B
61A
79B
20A
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 81

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 82


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 65)
R. 5 W.
(Joins sheet 81)
(Joins sheet 83)
(Joins sheet 99)
T. 46 N.
595 000 FEET
2 325 000 FEET
HIAWATHA
C H I P P E W A
NATIONAL
FOREST
ROAD
SALT
POINT
1
2
3
10
11
12
18B
18D
19B
19D
19F
20A
21A
61A

CHIPPEWA COUNTY, MICHIGAN NO. 82

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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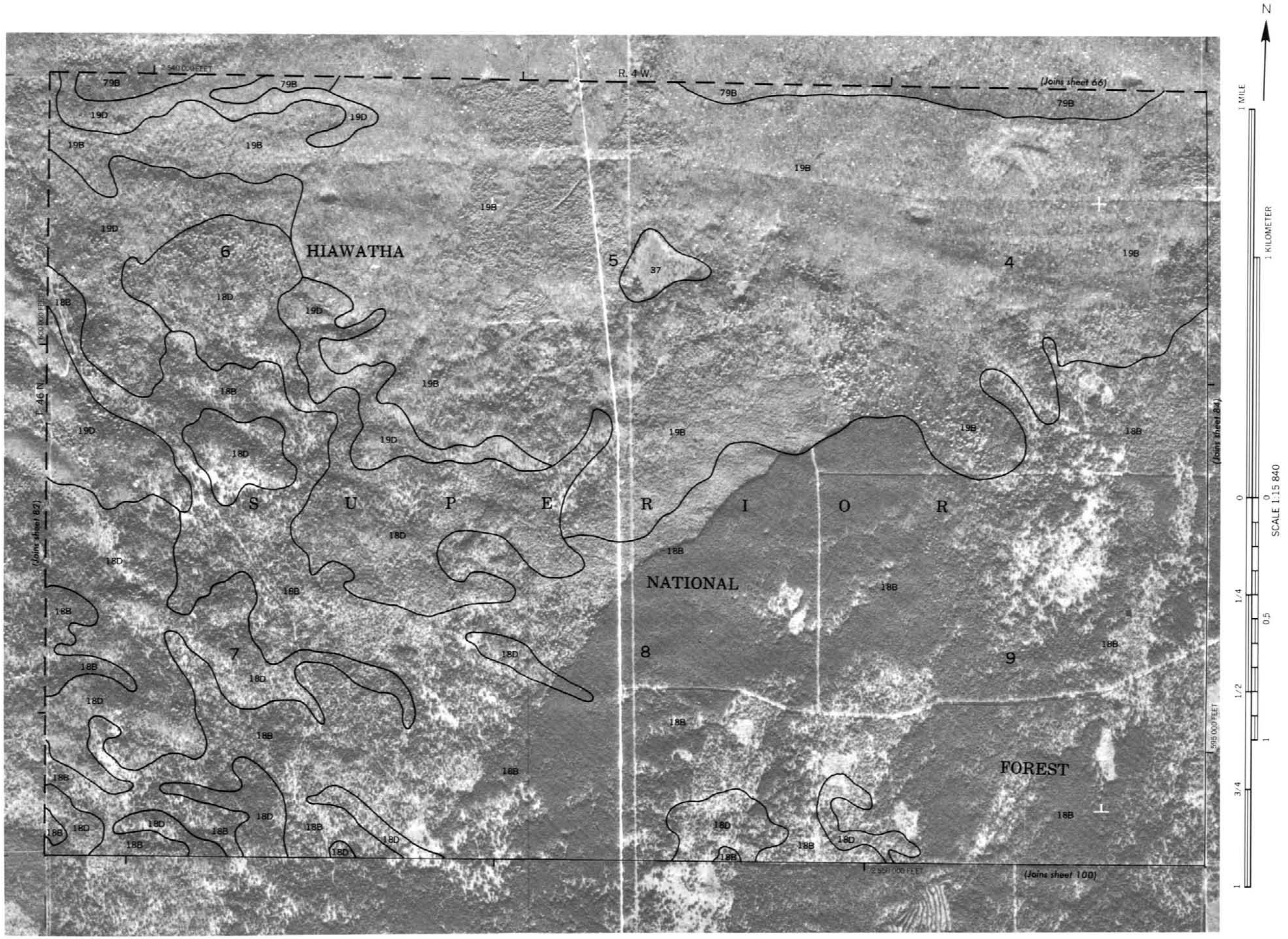
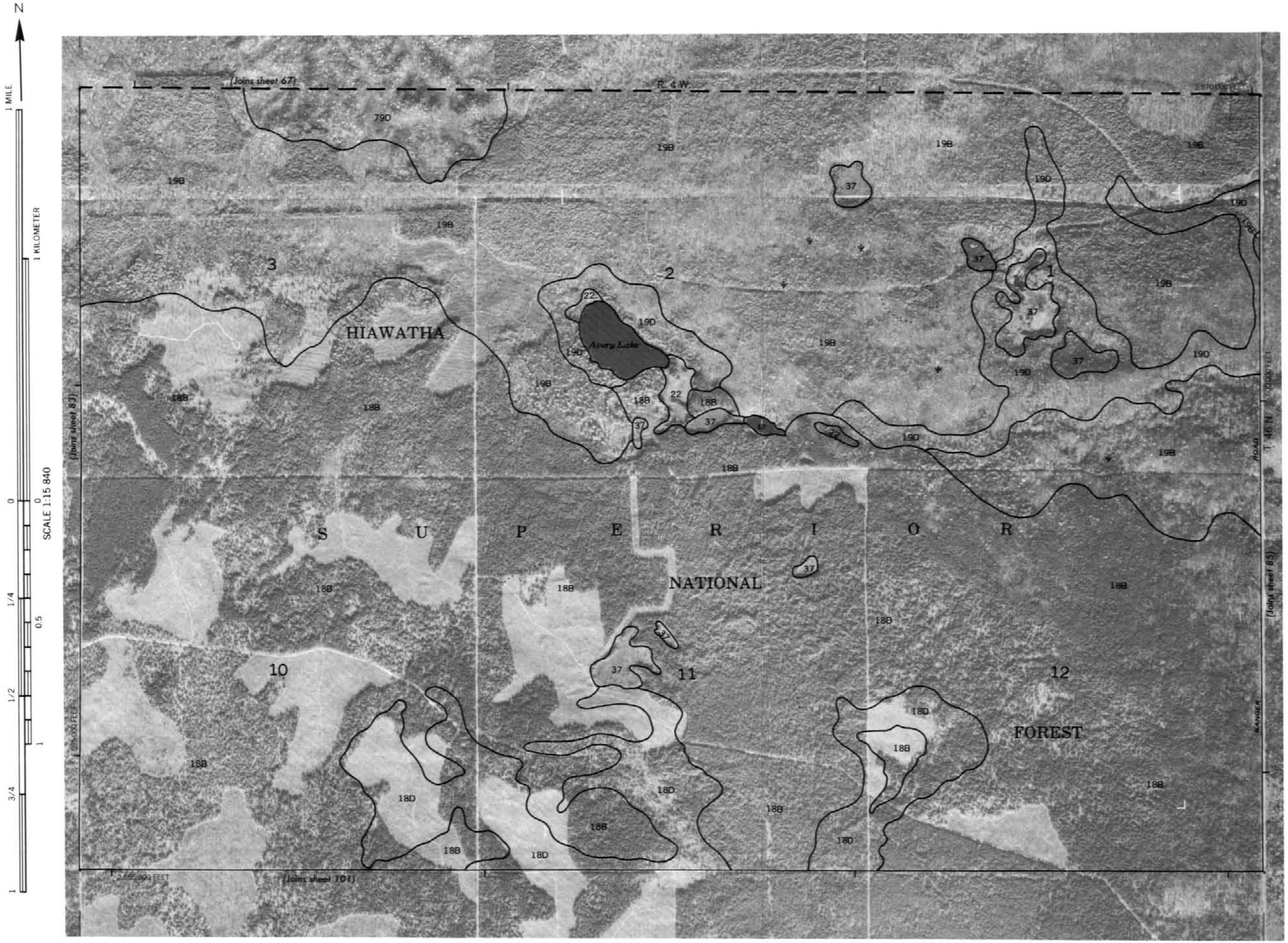
CHIPPEWA COUNTY, MICHIGAN NO. 83


N
2 540 000 FEET
R. 4 W.
(Joins sheet 66)
79B
79B
79B
79B
19D
19D
19B
19B
19B
19B
19D
6
HIAWATHA
5
37
4
19B
18B
18D
19D
1 600 000 FEET
18B
19B
T. 46 N.
19D
18D
19D
19B
19B
19B
18B
(Joins sheet 84)
(Joins sheet 82)
S U P E R I O R
18D
18D
18B
NATIONAL
18B
18B
18B
7
18D
8
9
18B
18B
18D
18D
18B
595 000 FEET
18B
FOREST
18B
18B
18D
18D
18B
18B
18D
18B
18B
18D
18D
18D
18B
18B
18D
18B
18D
2 560 000 FEET
(Joins sheet 100)
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 84

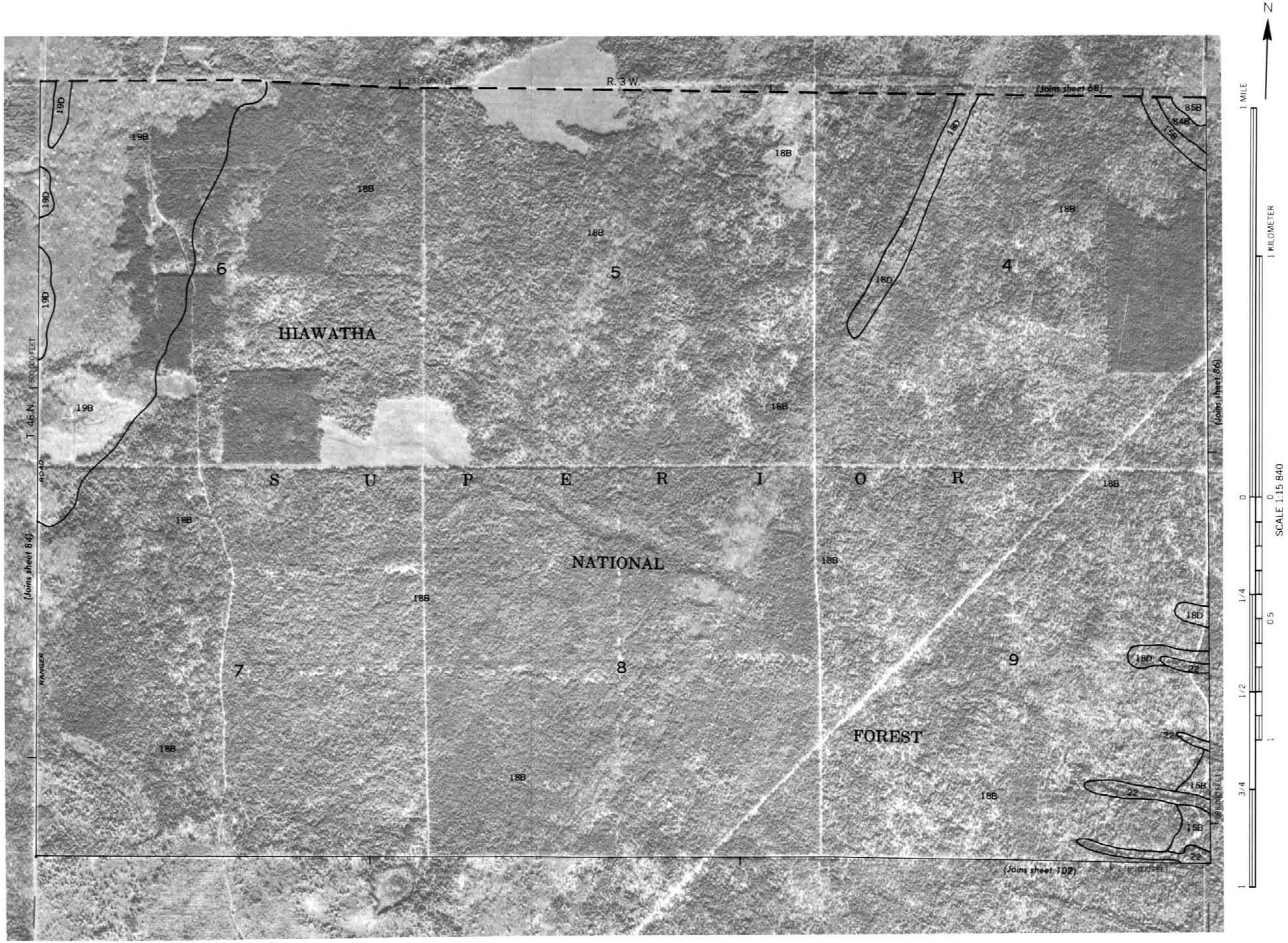

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 67)
R. 4 W.
2 570 000 FEET
79D
19B
37
19D
3
2
1
HIAWATHA
22
Avery Lake
18B
(Joins sheet 83)
67
S U P E R I O R
NATIONAL
FOREST
10
11
12
18D
(Joins sheet 85)
T. 46 N.
RANGER ROAD
(Joins sheet 101)
2 560 000 FEET
595 000 FEET
600 000 FEET

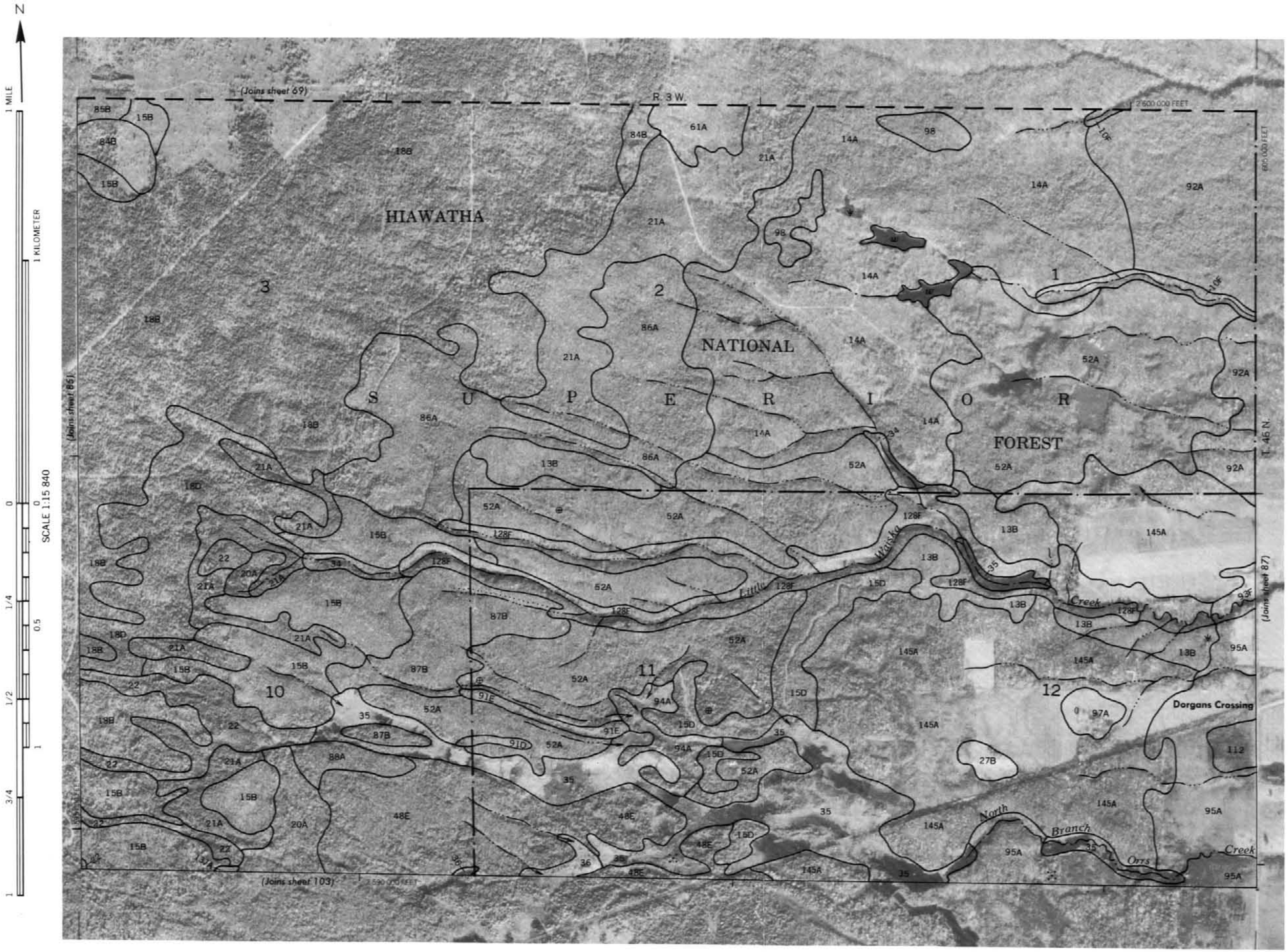
CHIPPEWA COUNTY, MICHIGAN NO. 84

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 85


N
R. 3 W.
(Joins sheet 68)
(Joins sheet 84)
(Joins sheet 86)
(Joins sheet 102)
T. 46 N.
RANGER ROAD
HIAWATHA
S U P E R I O R
NATIONAL
FOREST
4
5
6
7
8
9
19D
19D
19D
19B
19B
18B
18D
18D
18D
85B
84B
15B
15B
15B
22
22
22
22
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
SCALE 1:15 840


N
1 MILE
1 KILOMETER
0
SCALE 1:15 840
1/4
0.5
1/2
1
3/4
1
(Joins sheet 69)
R. 3 W.
2 600 000 FEET
605 000 FEET
(Joins sheet 85)
(Joins sheet 87)
(Joins sheet 103)
T. 46 N.
HIAWATHA
NATIONAL
S U P E R I O R
FOREST
1
2
3
10
11
12
85B
15B
84B
18B
61A
21A
14A
98
10F
92A
86A
52A
13B
128F
34
35
145A
22
20A
18D
87B
91E
91D
94A
15D
88A
48E
36
27B
97A
112
95A
93F
Little Waiska Creek
North Branch Orrs Creek
Dorgans Crossing

CHIPPEWA COUNTY, MICHIGAN NO. 86

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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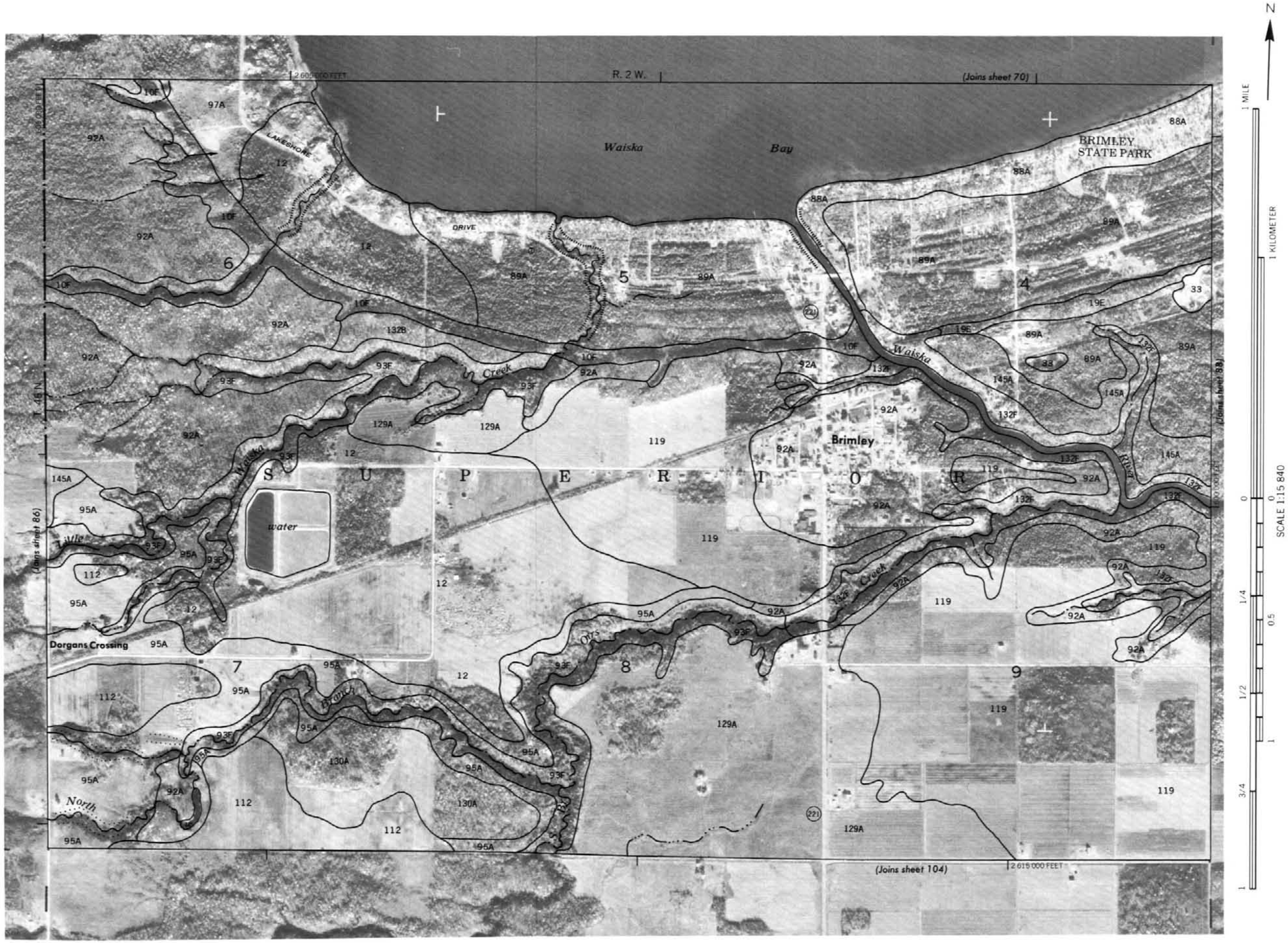
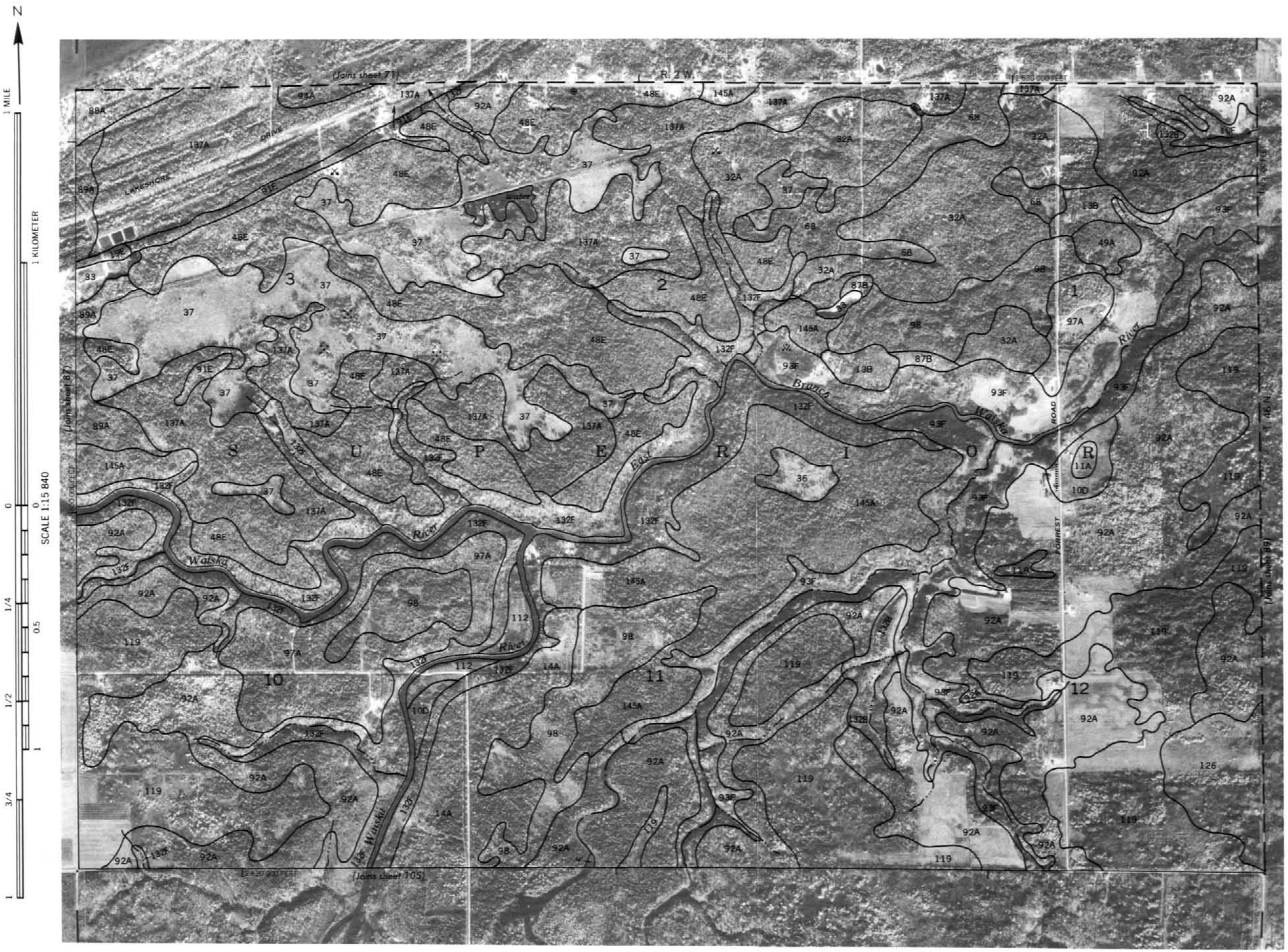
CHIPPEWA COUNTY, MICHIGAN NO. 87


N
R. 2 W.
2 600 000 FEET
(Joins sheet 70)
(Joins sheet 88)
(Joins sheet 86)
(Joins sheet 104)
2 615 000 FEET
T. 46 N.
Waiska Bay
BRIMLEY STATE PARK
LAKESHORE
DRIVE
Brimley
Waiska Creek
Waiska River
Little Waiska
North Branch
Otter Creek
Dorgans Crossing
water
S U P E R I O R
221
4
5
6
7
8
9
10F
12
19E
33
88A
89A
92A
93F
95A
97A
112
119
129A
130A
132B
132F
145A
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

⑧⑧

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 88



N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 71)
R. 2 W.
(Joins sheet 87)
(Joins sheet 89)
(Joins sheet 105)
T. 45 N.
LAKESHORE
DRIVE
FORREST
ROAD
East
Branch
Waiska
River
Waiska
River
S
U
P
E
R
I
O
R
2
3
1
10
11
12
88A
89A
33
37
48E
91E
92A
93F
94A
98
137A
145A
132F
32A
68
13B
49A
36
87B
97A
119
11A
10D
112
14A
126
Water

CHIPPEWA COUNTY, MICHIGAN NO. 88

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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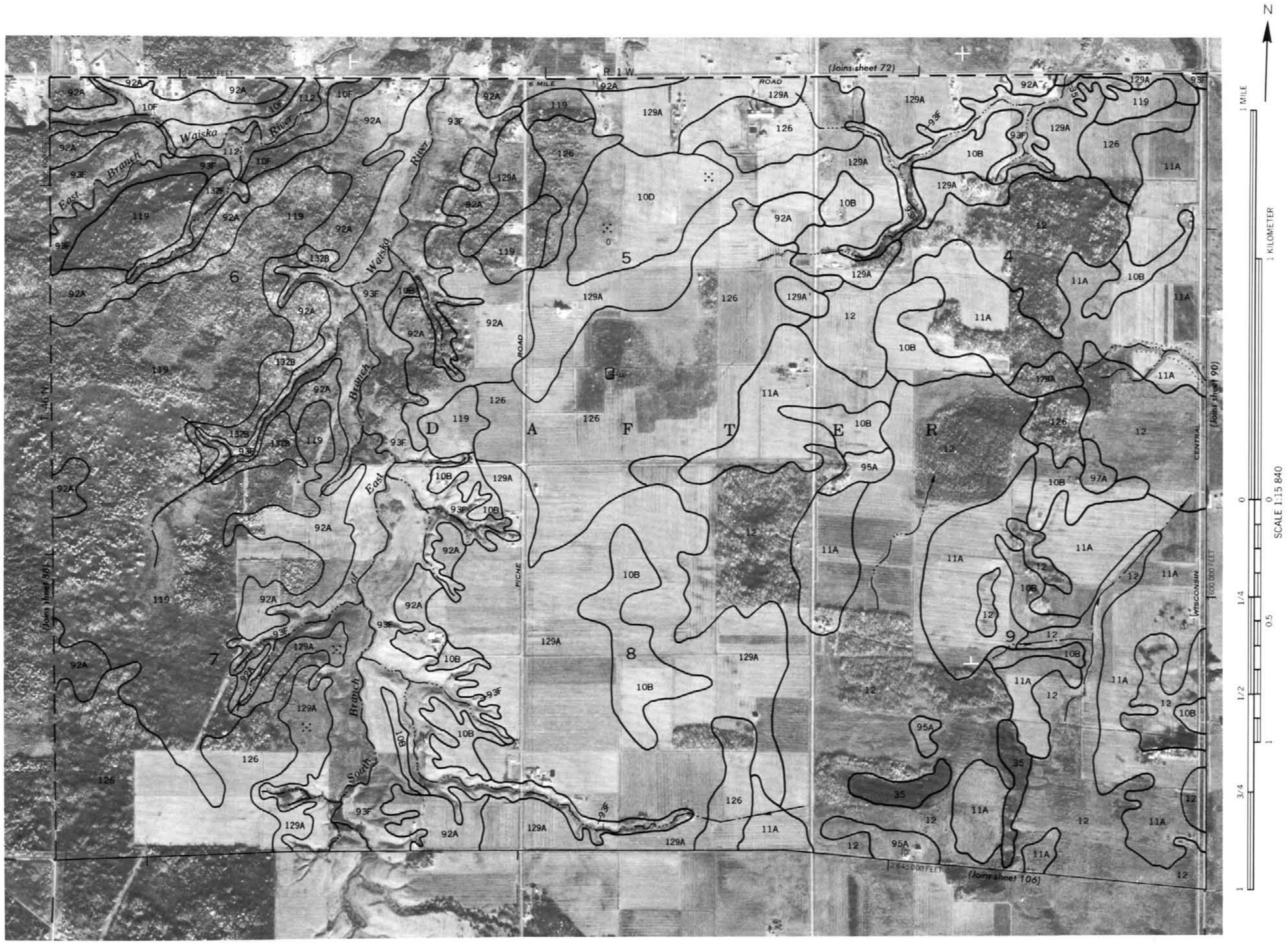
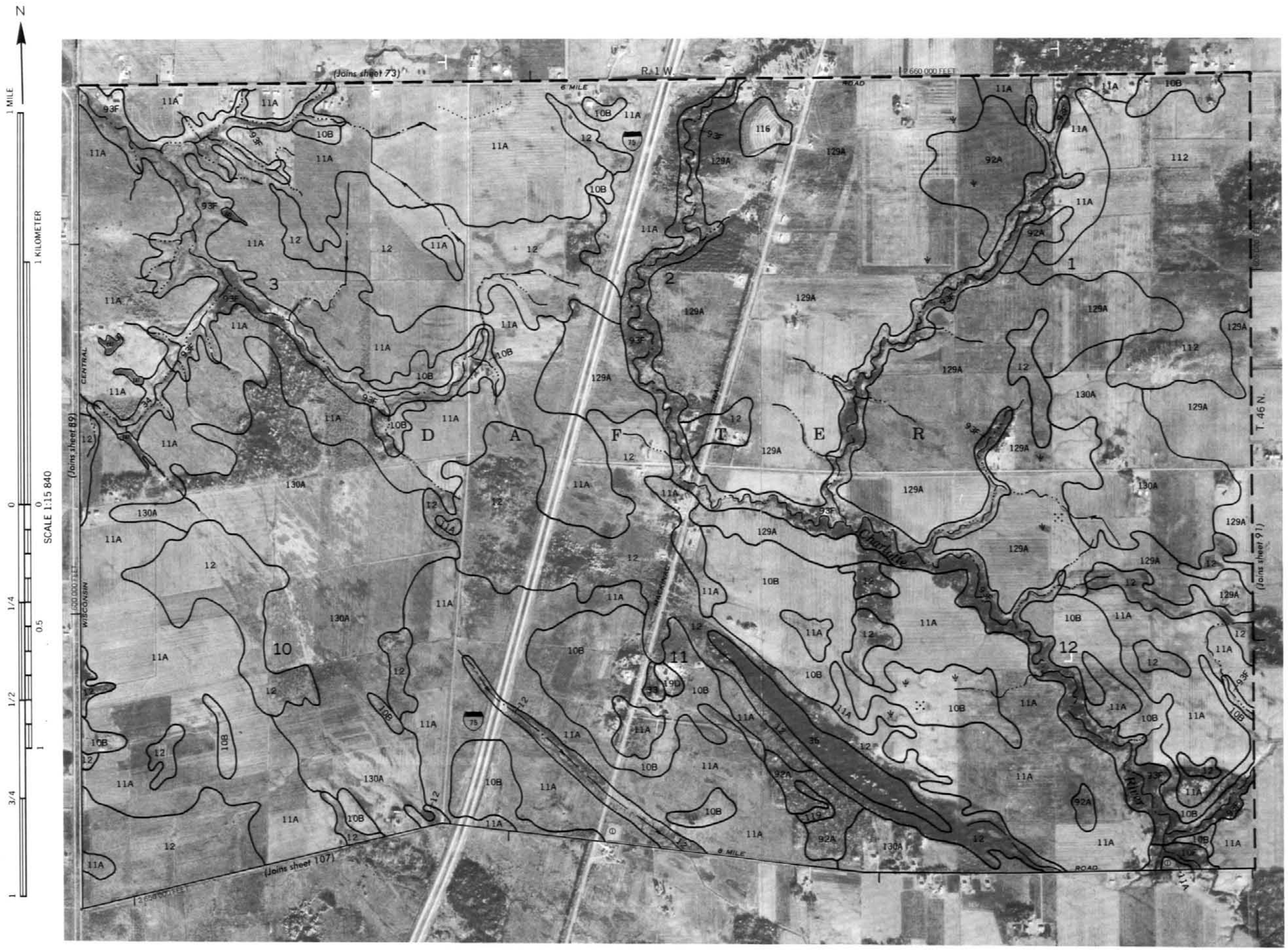
CHIPPEWA COUNTY, MICHIGAN NO. 89


(Joins sheet 72)
R. 1 W.
T. 46 N.
(Joins sheet 88)
(Joins sheet 90)
(Joins sheet 106)
2 640 000 FEET
560 000 FEET
6 MILE ROAD
PICHE ROAD
CENTRAL
WISCONSIN
Waiska River
East Branch
East Branch of Waiska River
South Branch of East Branch
DAFTER
4
5
6
7
8
9
10B
10D
10F
11A
12
35
92A
93F
95A
97A
112
119
126
129A
132B
N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 90

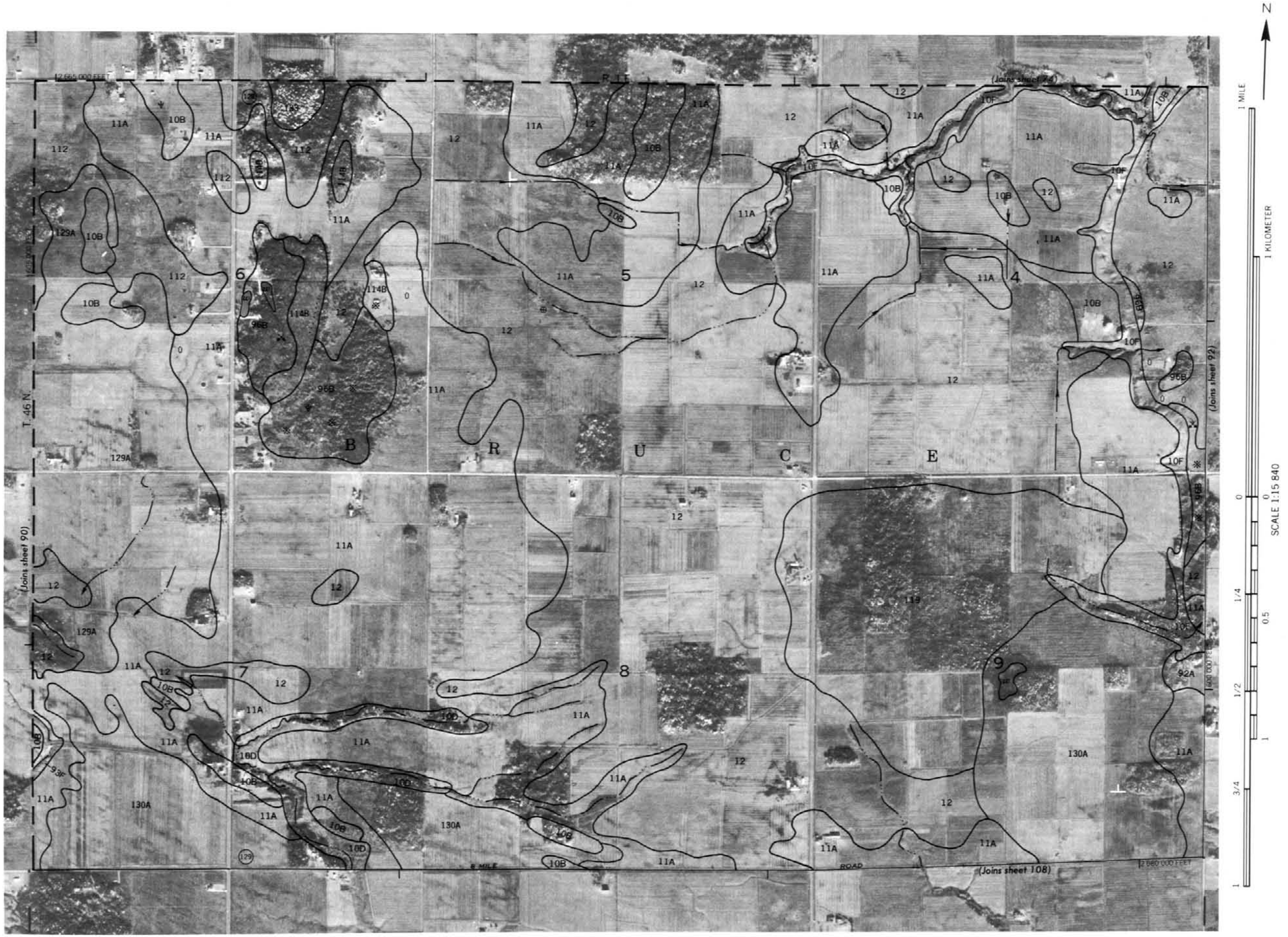

N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
SCALE 1:15 840
(Joins sheet 73)
(Joins sheet 89)
(Joins sheet 91)
(Joins sheet 107)
R. 1 W.
T. 46 N.
2 660 000 FEET
600 000 FEET
2 650 000 FEET
6 MILE ROAD
8 MILE ROAD
CENTRAL
WISCONSIN
75
DAFTER
Charlotte
River
1
2
3
10
11
12
11A
10B
12
93F
92A
112
116
129A
130A
35
19D
39
119

CHIPPEWA COUNTY, MICHIGAN NO. 90

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

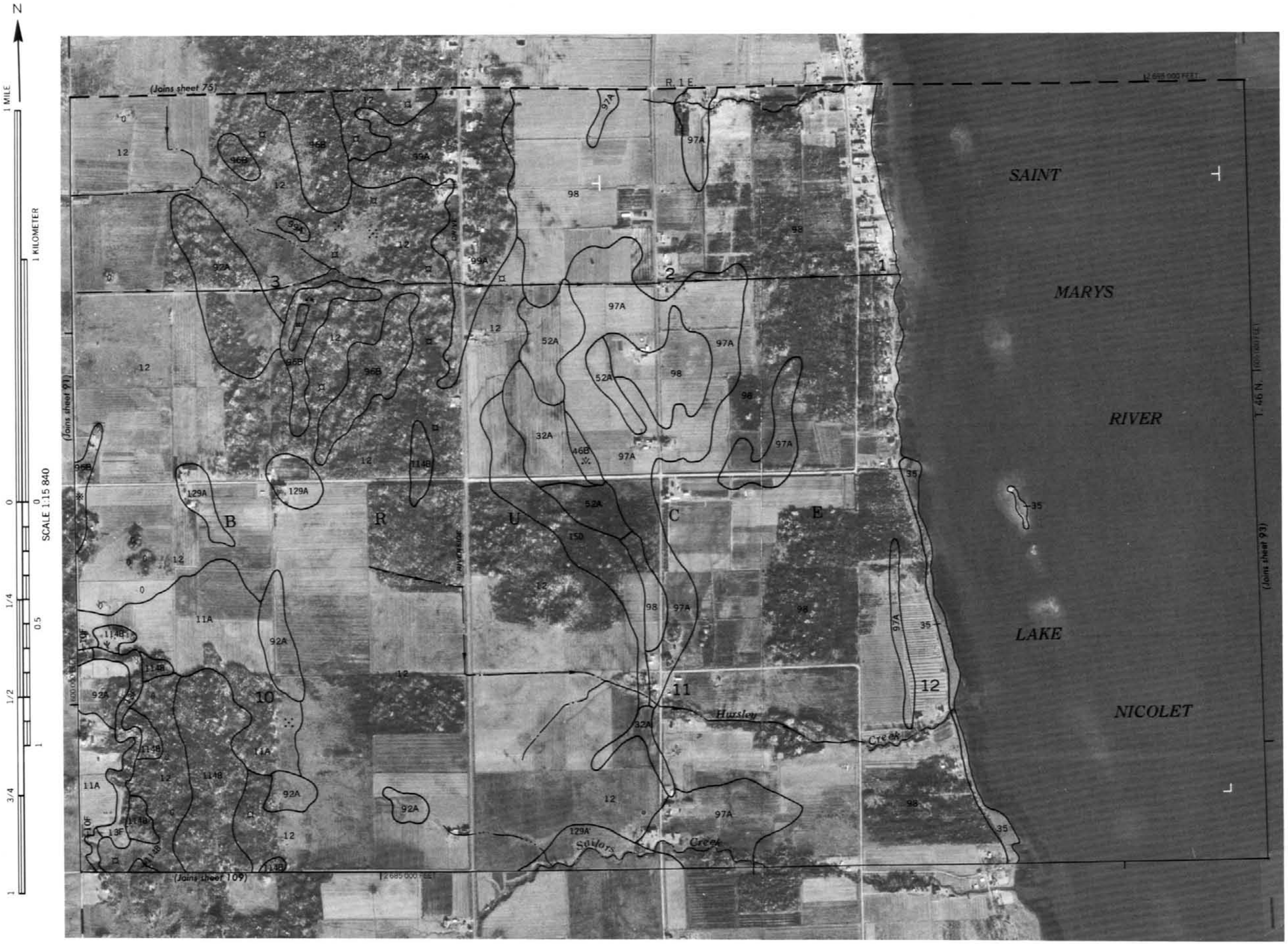
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 91


N
2 665 000 FEET
R. 1 E.
(Joins sheet 74)
(Joins sheet 90)
(Joins sheet 92)
(Joins sheet 108)
T. 46 N.
B R U C E
4
5
6
7
8
9
8 MILE ROAD
129
2 660 000 FEET
11A
10B
12
112
129A
130A
96B
114B
10F
10D
119
92A
93F
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

(92)

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 92

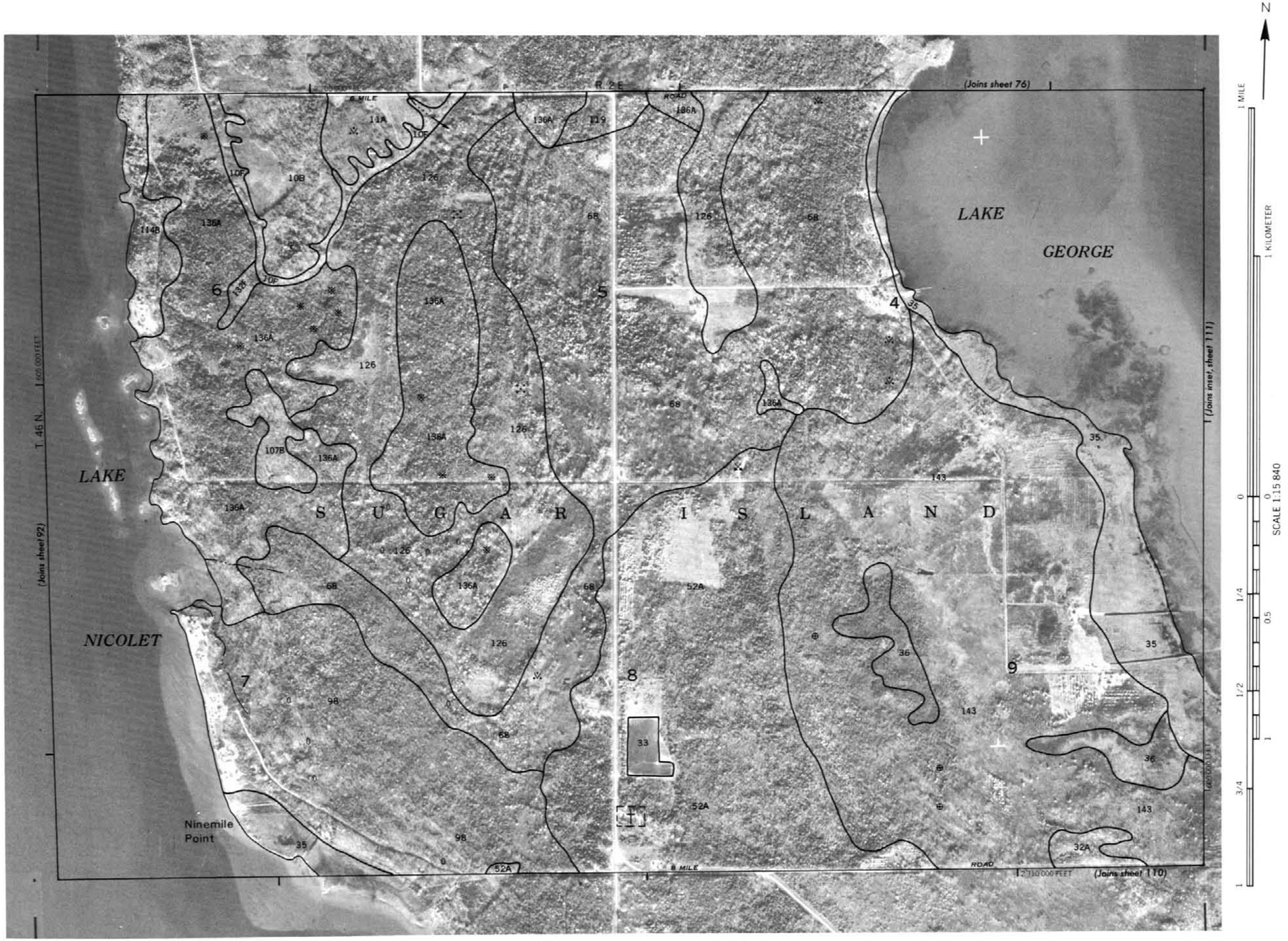

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 75)
(Joins sheet 91)
(Joins sheet 93)
(Joins sheet 109)
R. 1 E.
T. 46 N.
12 685 000 FEET
2 685 000 FEET
SAINT
MARYS
RIVER
LAKE
NICOLET
B
R
U
C
E
1
2
3
10
11
12
Hursley
Creek
Sailors
Creek
Riverside
Drive
12
0
96B
93A
92A
99A
97A
98
52A
32A
46B
129A
114B
11A
10F
13F
13B
150
35
129A

CHIPPEWA COUNTY, MICHIGAN NO. 92

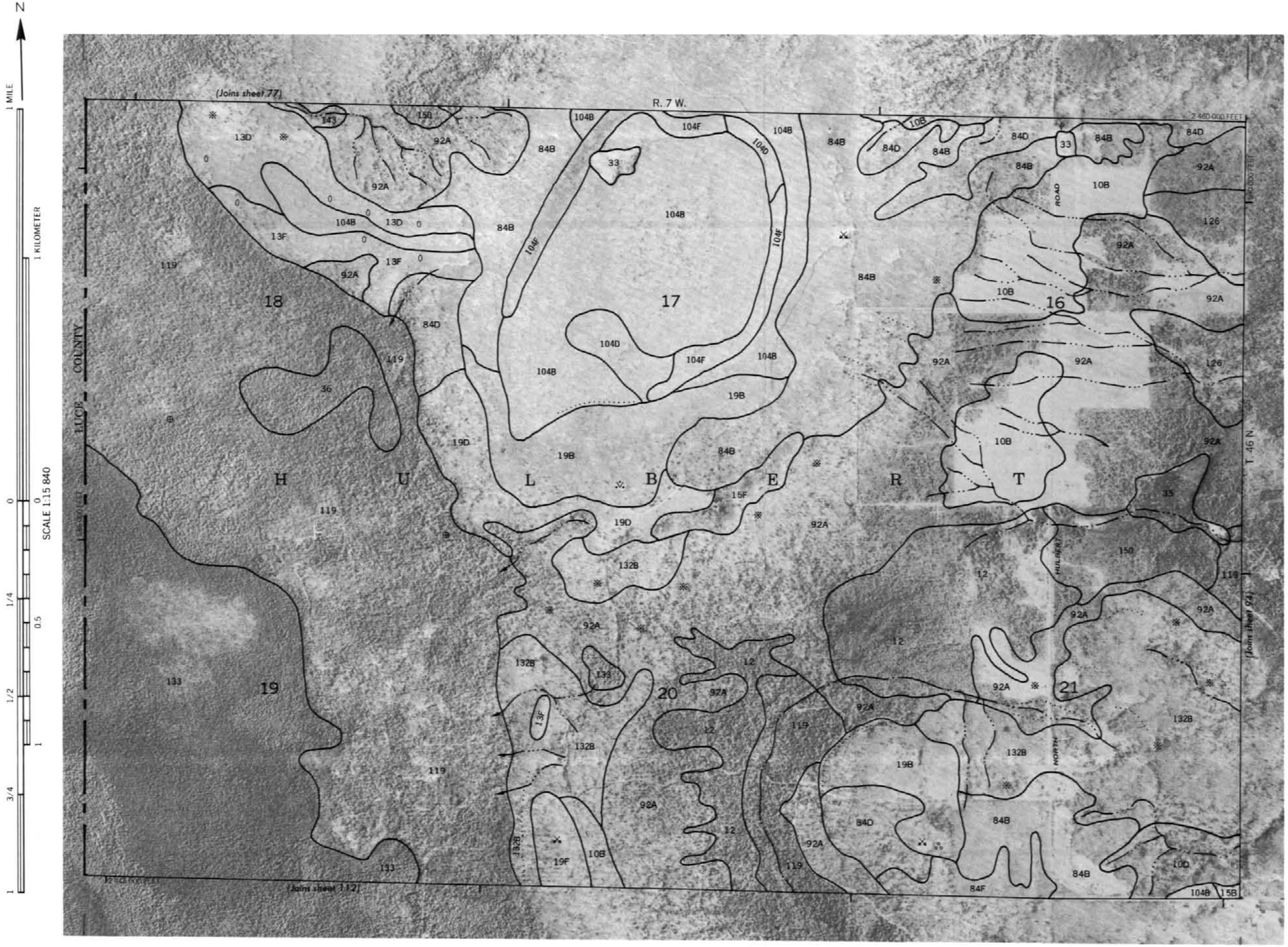
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 93

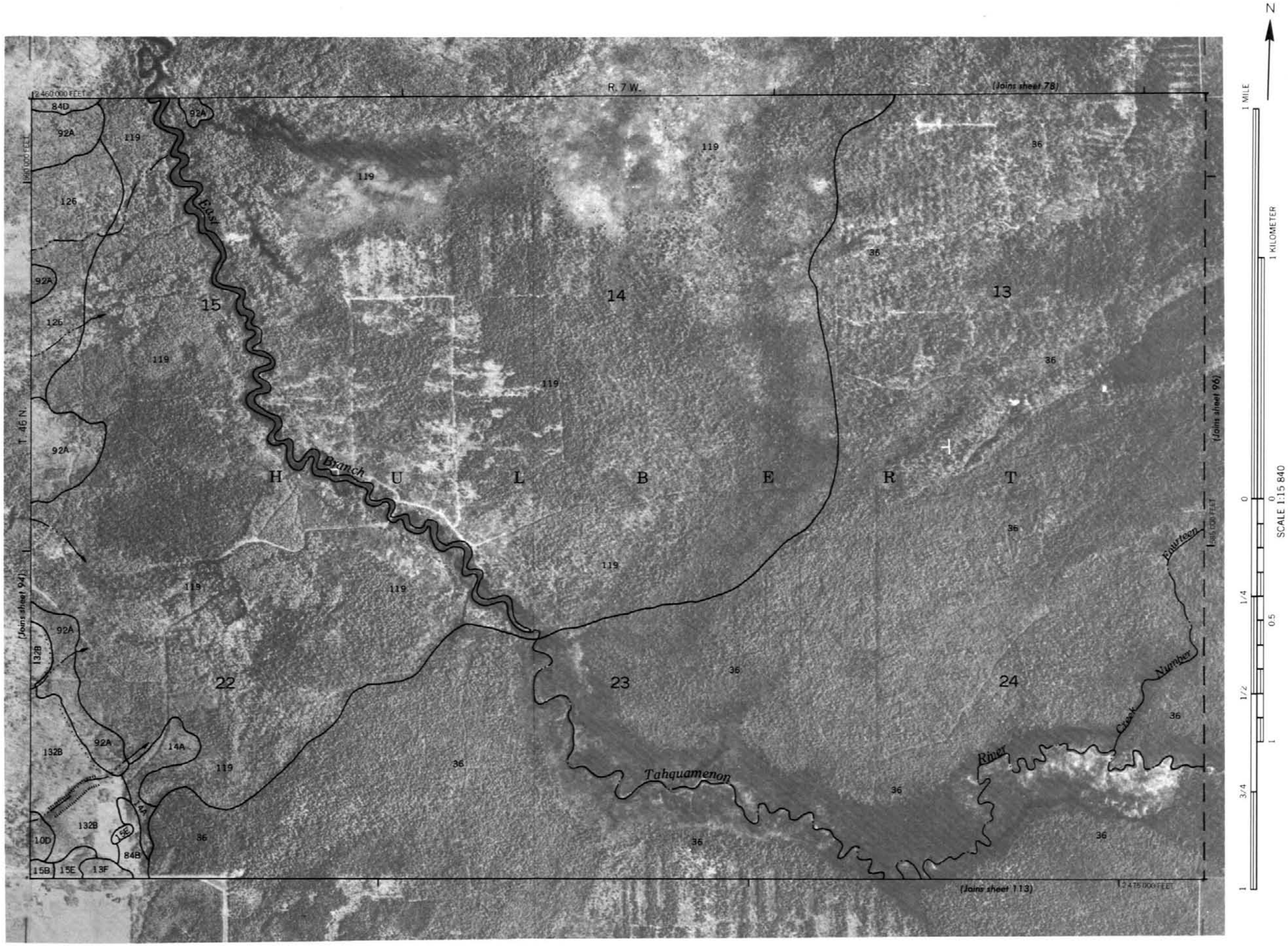

N
R. 2 E.
(Joins sheet 76)
6 MILE
ROAD
11A
10F
10B
136A
119
126
68
114B
132F
6
5
4
LAKE
GEORGE
35
136A
107B
T. 46 N.
605 000 FEET
(Joins sheet 92)
(Joins inset, sheet 111)
LAKE
NICOLET
S U G A R I S L A N D
143
52A
36
33
7
8
9
98
Ninemile
Point
35
52A
32A
6 MILE
ROAD
2 710 000 FEET
(Joins sheet 110)
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
SCALE 1:15 840

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 94


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
(Joins sheet 77)
R. 7 W.
2 460 000 FEET
T. 46 N.
(Joins sheet 94)
(Joins sheet 112)
LUCE COUNTY
H U L B E R T
ROAD
HULBERT
NORTH
16
17
18
19
20
21
13D
143
150
92A
104B
104F
104D
84B
84D
33
10B
13F
119
36
19D
19B
15F
132B
126
35
12
13F
19F
84F
10D
15B
133

CHIPPEWA COUNTY, MICHIGAN NO. 94

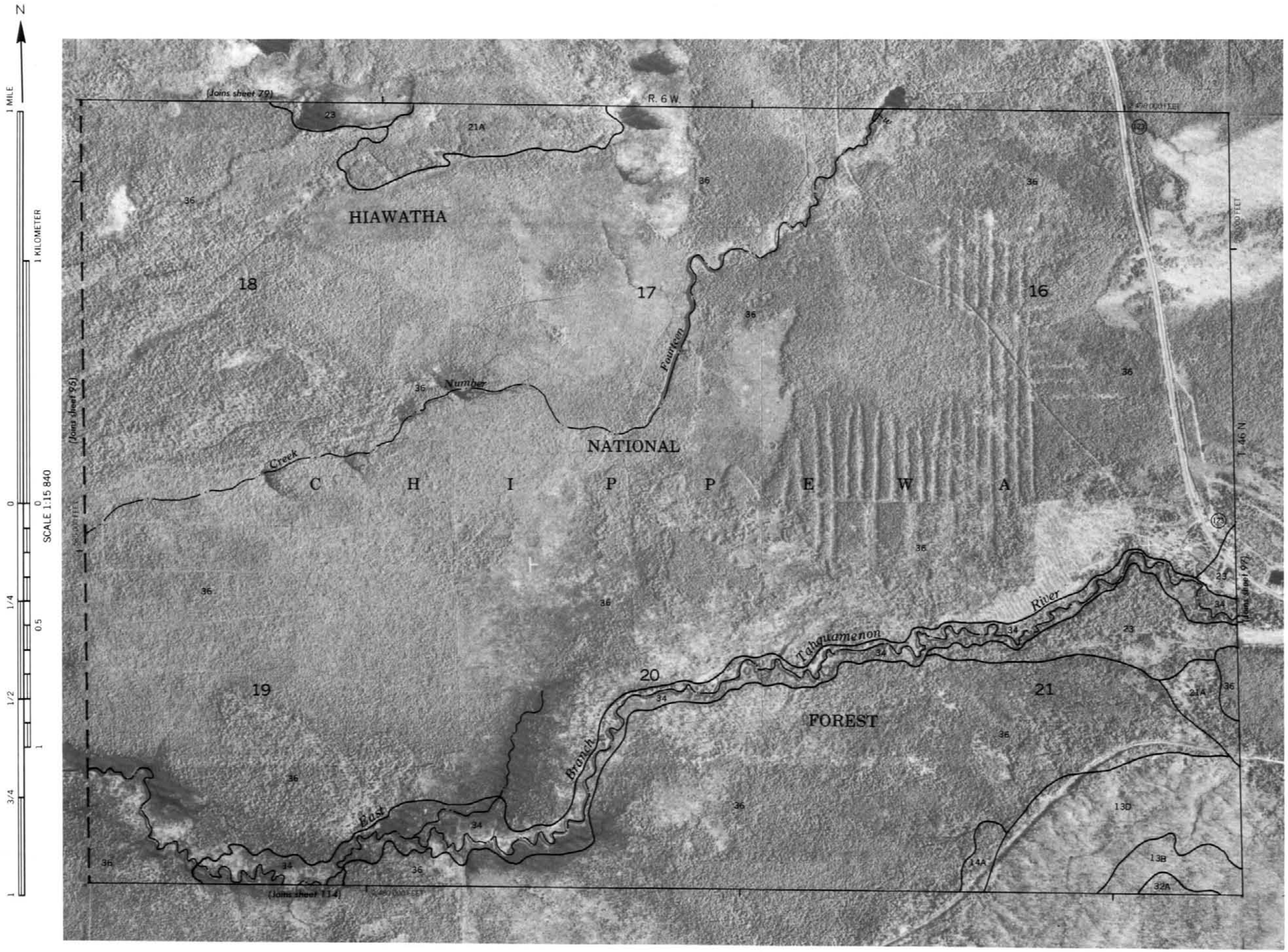
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
R. 7 W.
(Joins sheet 78)
(Joins sheet 94)
(Joins sheet 96)
(Joins sheet 113)
T. 46 N.
2 460 000 FEET
860 000 FEET
2 475 000 FEET
HULBERT
15
14
13
22
23
24
East Branch
Tahquamenon River
Fourteen Number Creek
84D
92A
119
126
132B
14A
10D
15E
15B
13F
84B
36
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

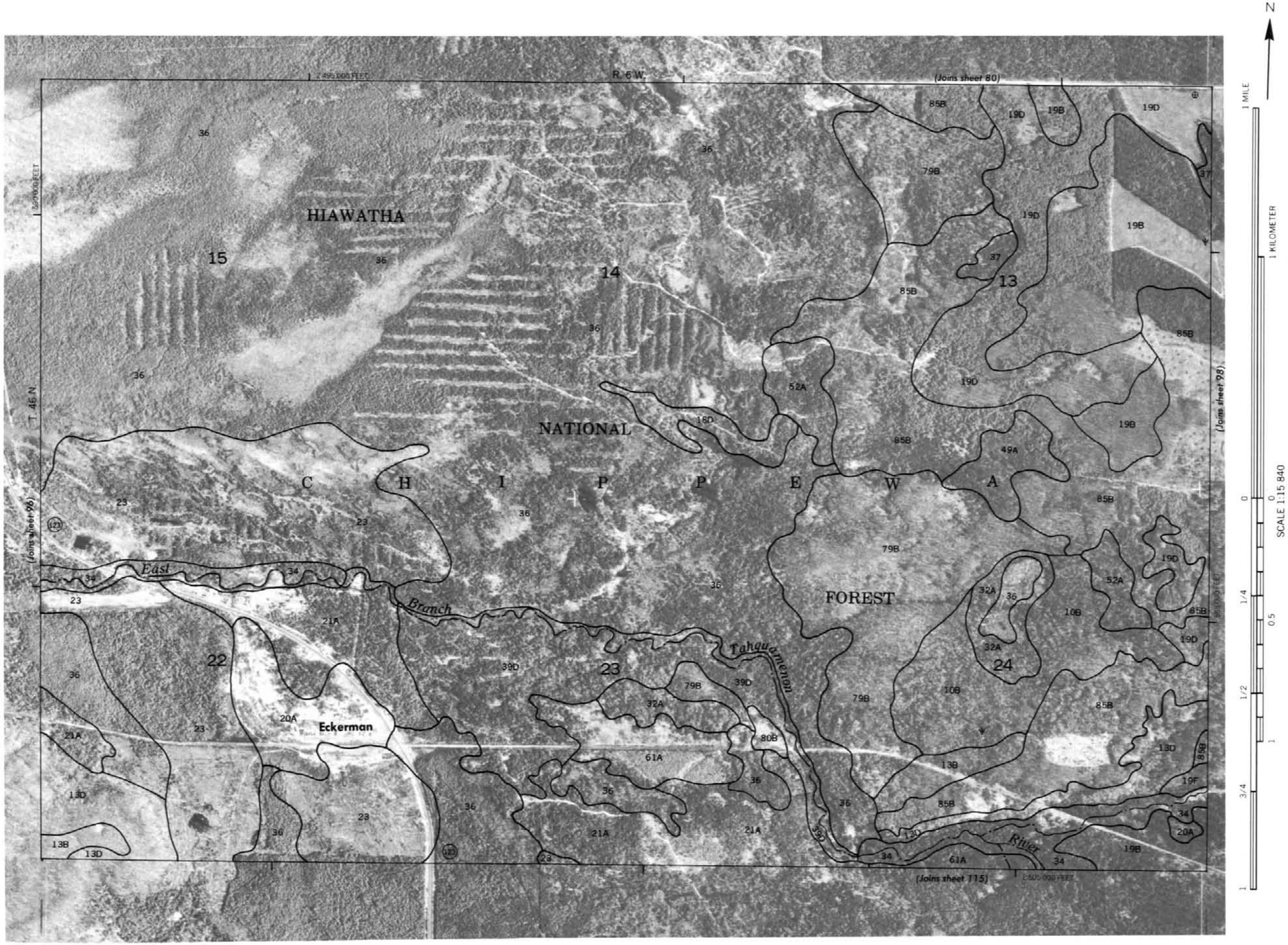
CHIPPEWA COUNTY, MICHIGAN NO. 95

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 96


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 79)
(Joins sheet 95)
(Joins sheet 97)
(Joins sheet 114)
R. 6 W.
T. 46 N.
123
123
HIAWATHA
NATIONAL
C H I P P E W A
FOREST
18
17
16
19
20
21
Fourteen
Number
Creek
Tahquamenon
River
East
Branch
23
21A
36
34
13D
13B
14A
32A

CHIPPEWA COUNTY, MICHIGAN NO. 96

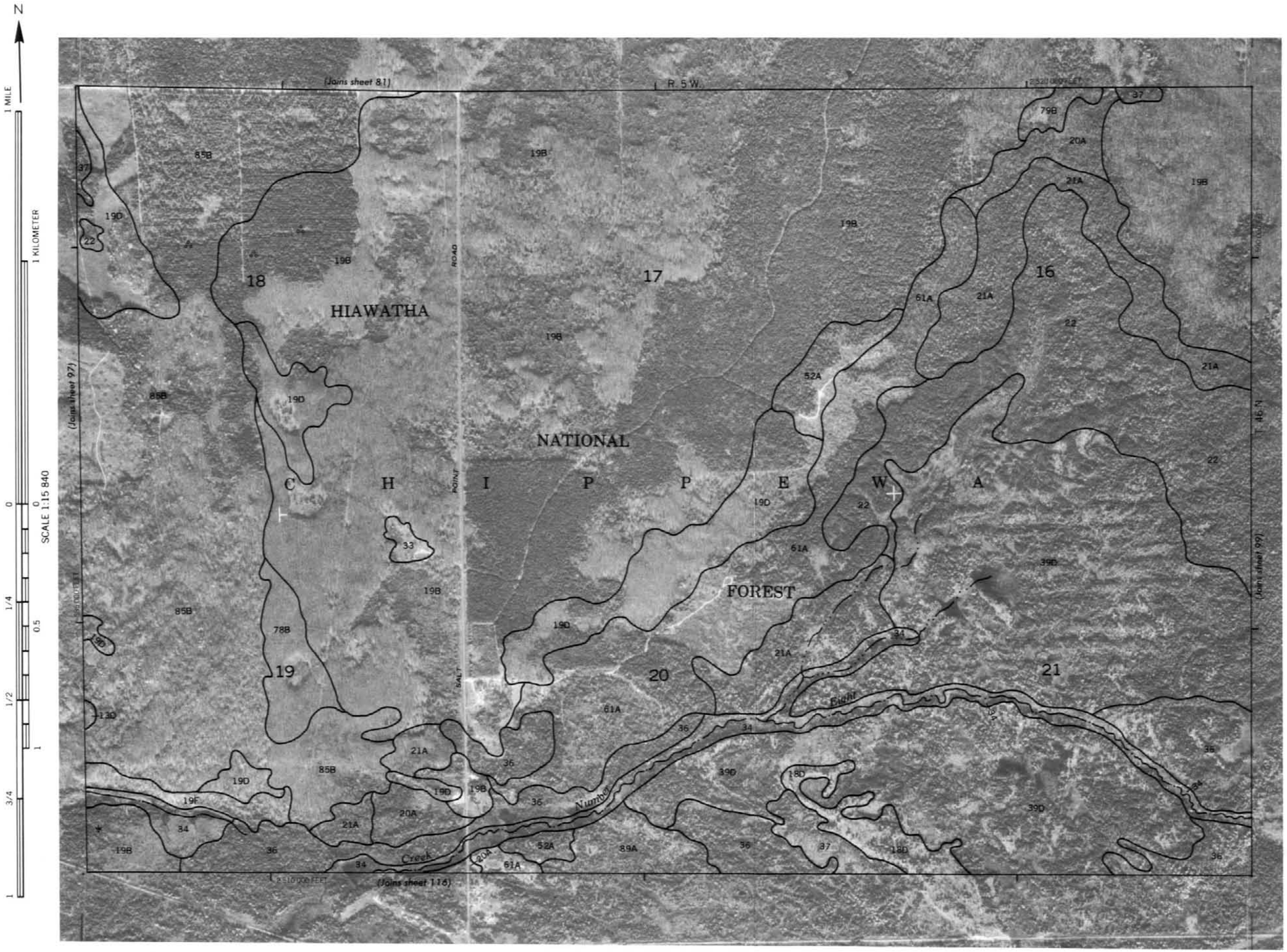
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
(Joins sheet 80)
R. 6 W.
2 490 000 FEET
T. 46 N.
(Joins sheet 96)
(Joins sheet 98)
(Joins sheet 115)
HIAWATHA
NATIONAL
FOREST
C H I P P E W A
15
14
13
22
23
24
East Branch
Tahquamenon River
Eckerman
36
23
34
21A
20A
13D
13B
39D
32A
79B
80B
61A
85B
19D
19B
37
52A
18D
49A
10B
13D
19F
89B
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 97

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 98


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 81)
R. 5 W.
2 520 000 FEET
(Joins sheet 97)
(Joins sheet 99)
(Joins sheet 116)
2 510 000 FEET
T. 46 N.
HIAWATHA
NATIONAL
C H I P P E W A
FOREST
SALT POINT ROAD
Eight
Number
Creek
18
17
16
19
20
21
85B
19D
22
37
19B
78B
33
13D
19F
34
36
21A
20A
52A
61A
89A
39D
18D
79B

CHIPPEWA COUNTY, MICHIGAN NO. 98

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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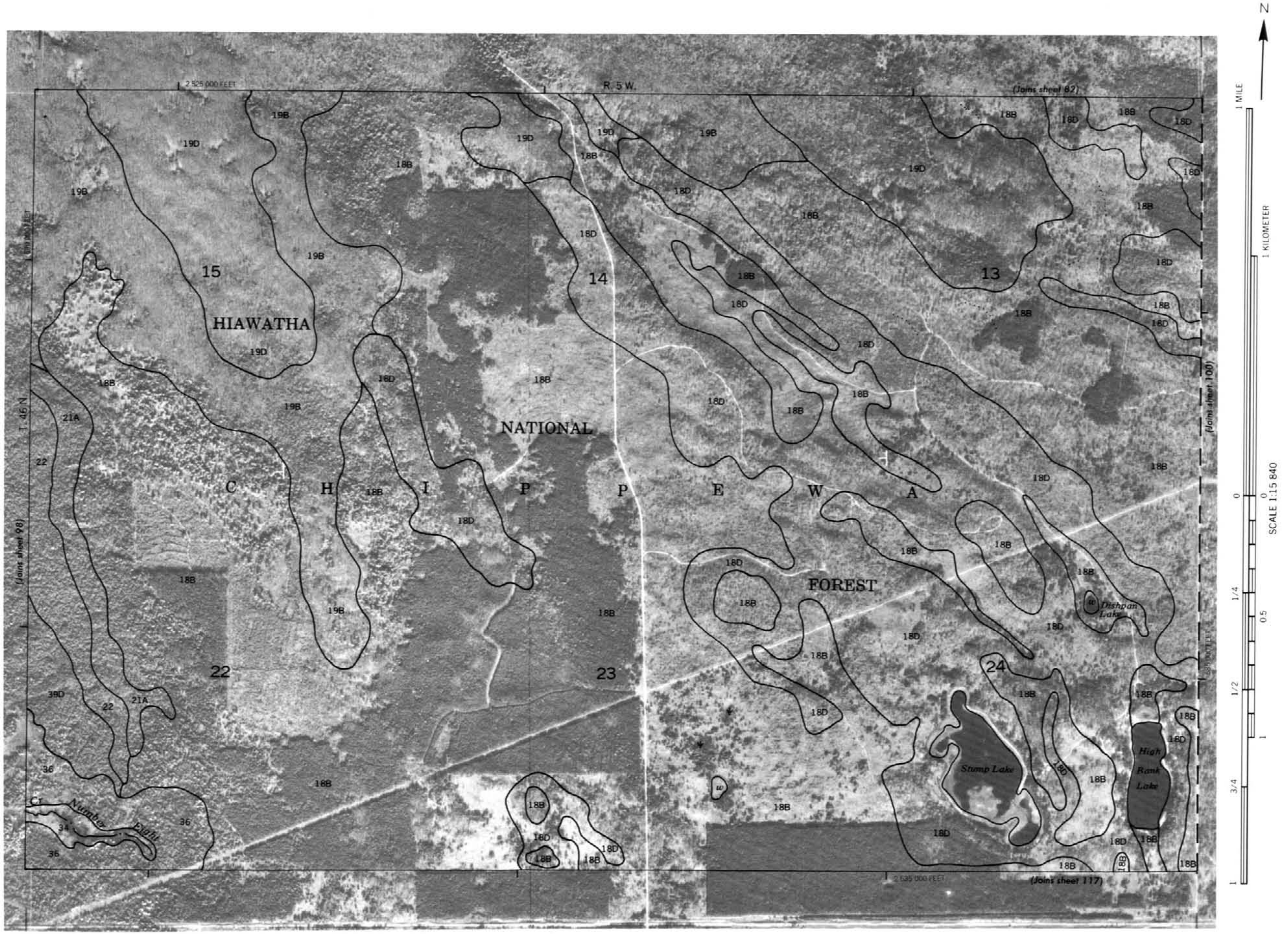
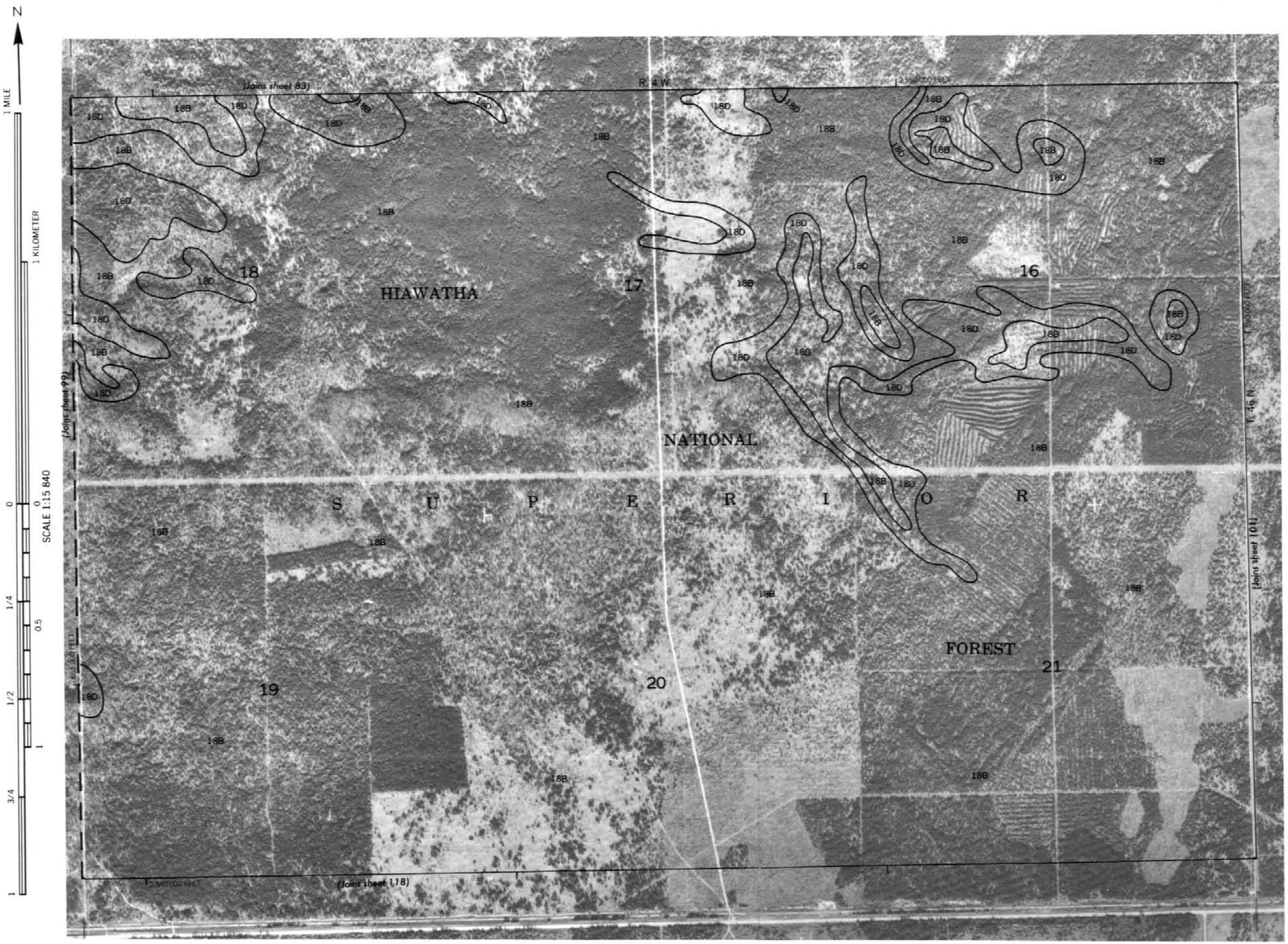
CHIPPEWA COUNTY, MICHIGAN NO. 99


N
R. 5 W.
T. 46 N.
2 525 000 FEET
2 535 000 FEET
(Joins sheet 82)
(Joins sheet 98)
(Joins sheet 100)
(Joins sheet 117)
HIAWATHA
NATIONAL
C H I P P E W A
FOREST
15
14
13
22
23
24
19B
19D
18B
18D
21A
22
39D
36
34
Cr
Number Eight
Dishpan Lake
Stump Lake
High Bank Lake
w
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5


N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
SCALE 1:15 840
(Joins sheet 83)
R. 4 W.
(Joins sheet 99)
(Joins sheet 101)
(Joins sheet 118)
T. 46 N.
HIAWATHA
NATIONAL
S U P E R I O R
FOREST
16
17
18
19
20
21
18B
18D

CHIPPEWA COUNTY, MICHIGAN NO. 100

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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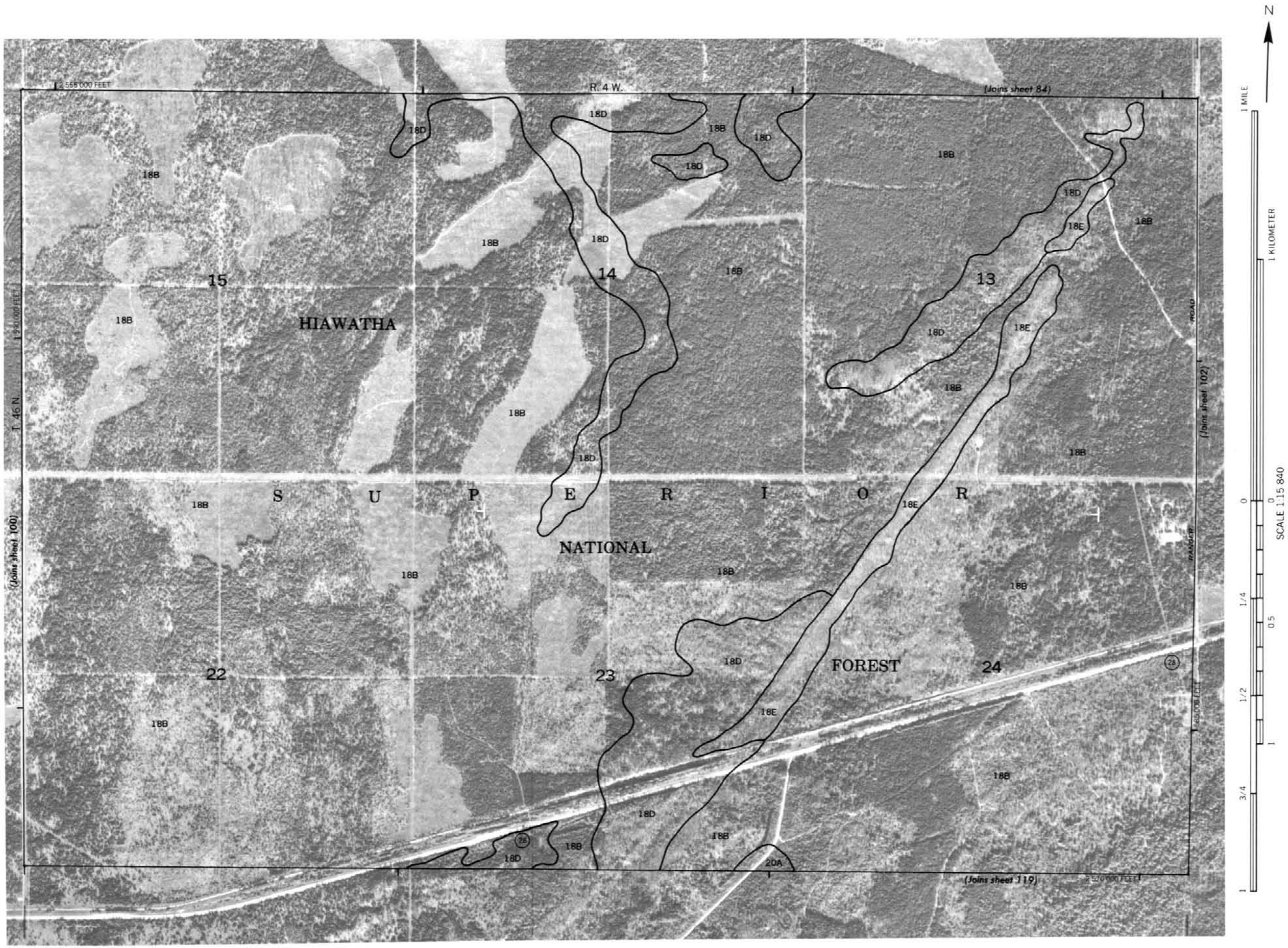
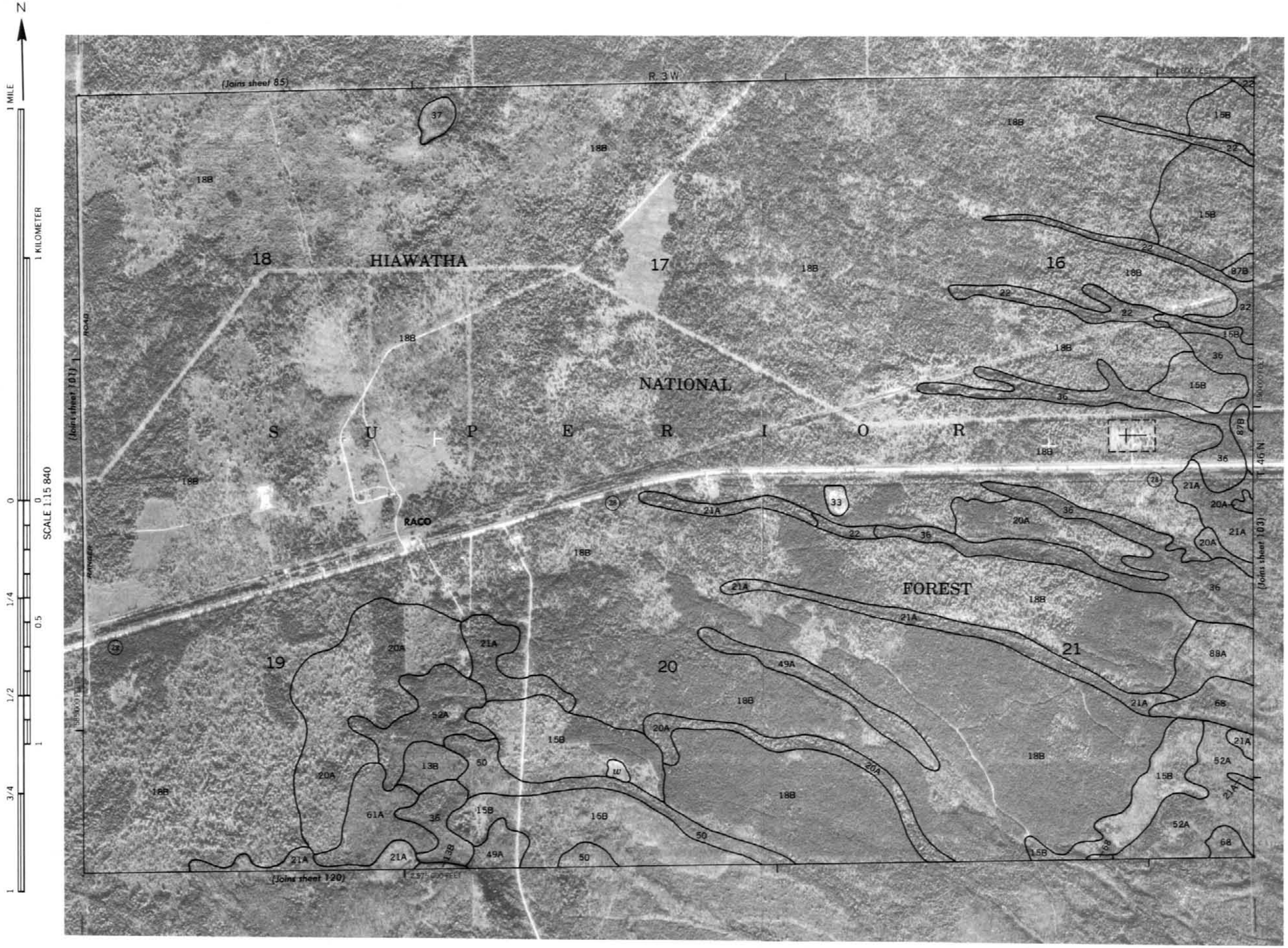
CHIPPEWA COUNTY, MICHIGAN NO. 101


101
N
2 555 000 FEET
R. 4 W.
(Joins sheet 84)
T. 46 N.
(Joins sheet 100)
(Joins sheet 102)
(Joins sheet 119)
ROAD
RANGER
15
14
13
22
23
24
HIAWATHA
S U P E R I O R
NATIONAL
FOREST
18B
18D
18E
20A
28
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 102


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 85)
R. 3 W.
(Joins sheet 101)
(Joins sheet 103)
(Joins sheet 120)
T. 46 N.
HIAWATHA
NATIONAL
S U P E R I O R
FOREST
RACO
RANGER ROAD
16
17
18
19
20
21
28
37
33
w
13B
15B
18B
20A
21A
22
36
49A
50
52A
61A
68
87B
88A

CHIPPEWA COUNTY, MICHIGAN NO. 102

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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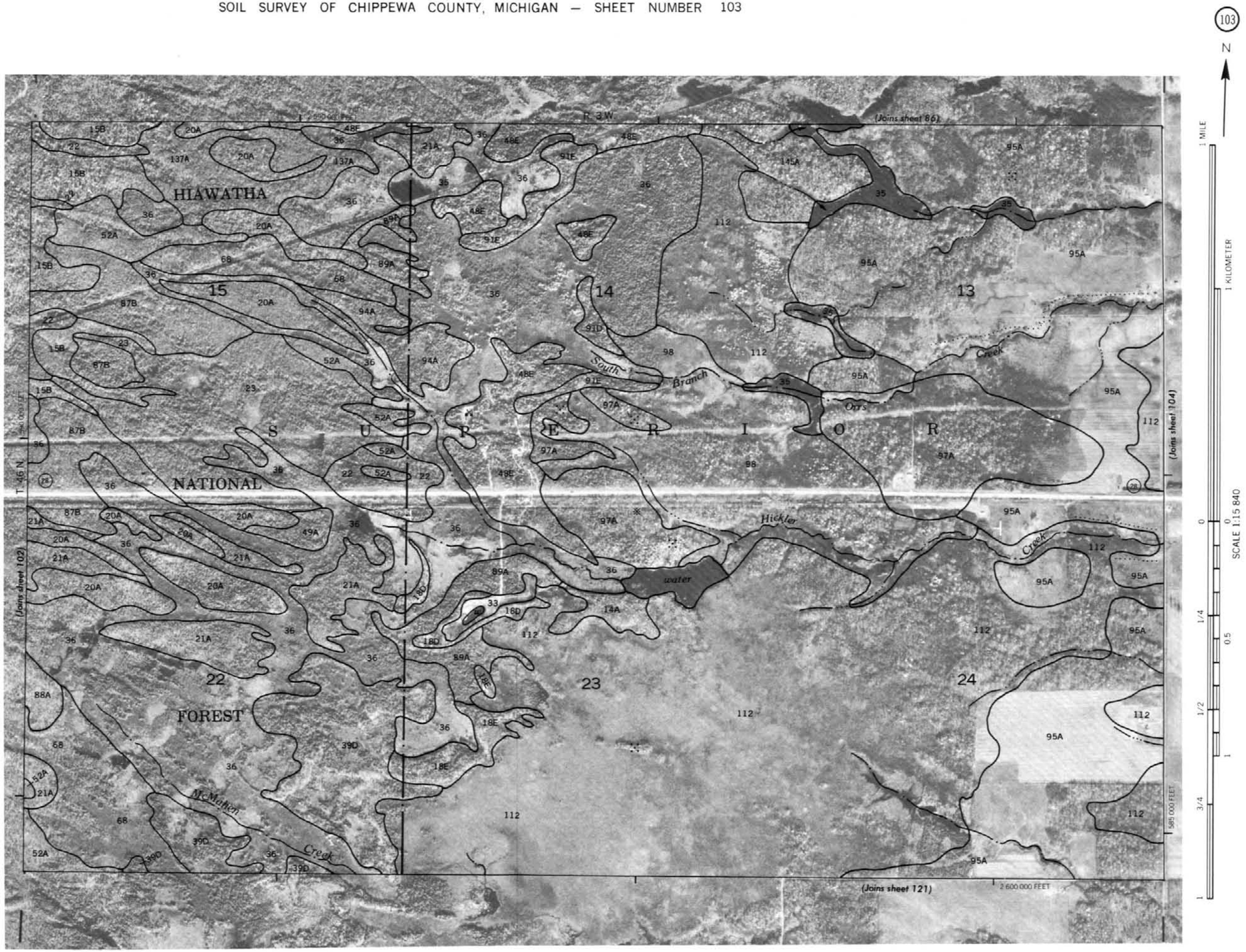
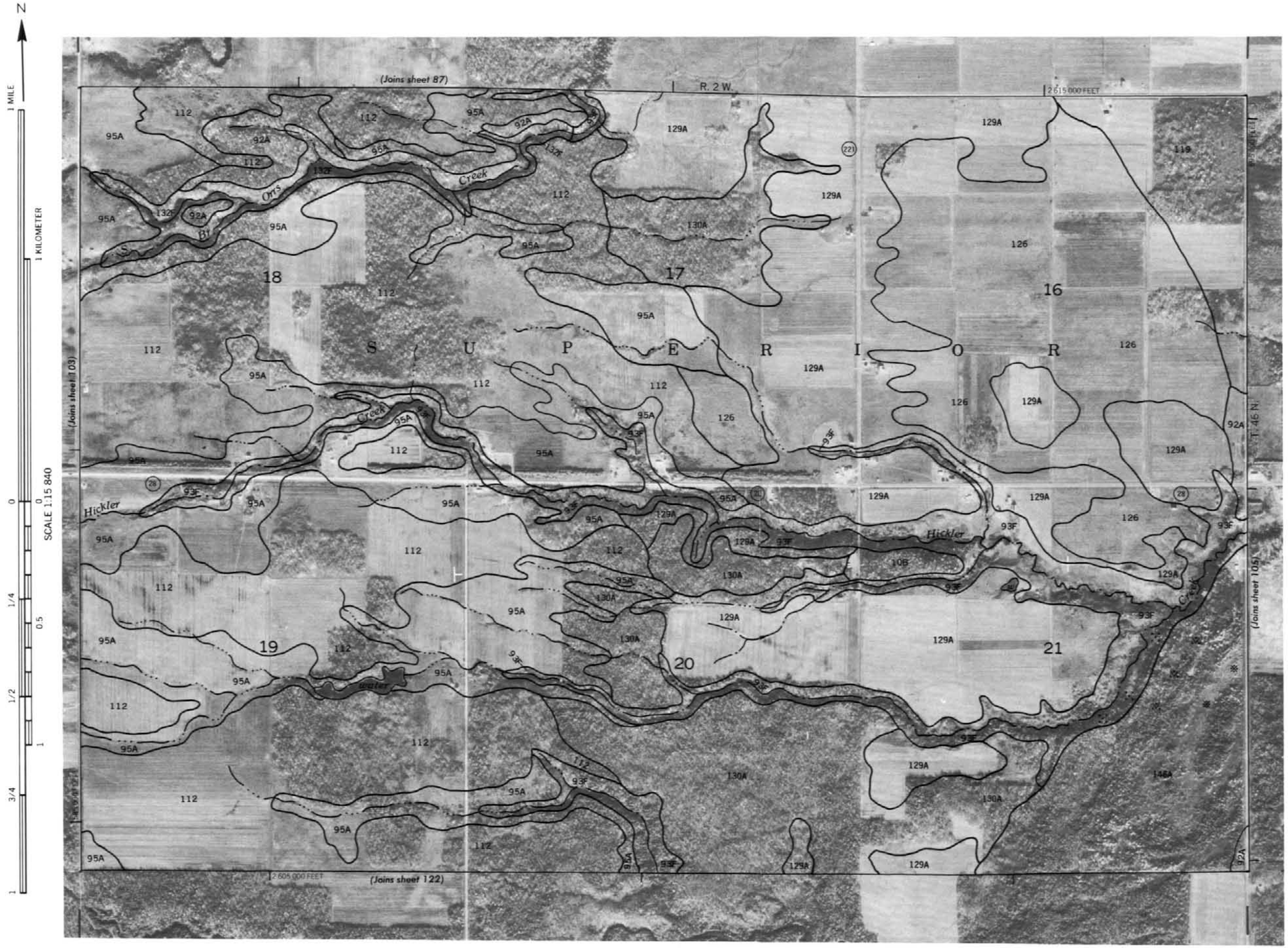
CHIPPEWA COUNTY, MICHIGAN NO. 103


103
N
(Joins sheet 86)
(Joins sheet 104)
(Joins sheet 121)
(Joins sheet 102)
R 3 W
T 46 N
HIAWATHA
NATIONAL
FOREST
S U P E R I O R
15
14
13
22
23
24
South Branch
Orrs Creek
Hickler Creek
McMahon Creek
water
28
2 600 000 FEET
585 000 FEET
15B
20A
21A
22
23
33
35
36
39D
48E
49A
52A
68
87B
88A
89A
91D
91E
94A
95A
97A
98
112
137A
145A
14A
18D
18E
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 104


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 87)
R. 2 W.
2 615 000 FEET
(Joins sheet 103)
(Joins sheet 105)
(Joins sheet 122)
2 605 000 FEET
T. 46 N.
S U P E R I O R
16
17
18
19
20
21
Orrs Creek
Br.
Creek
Hickler Creek
Hickler
water
28
221
95A
92A
93F
112
119
126
129A
130A
132F
10B
148A

CHIPPEWA COUNTY, MICHIGAN NO. 104

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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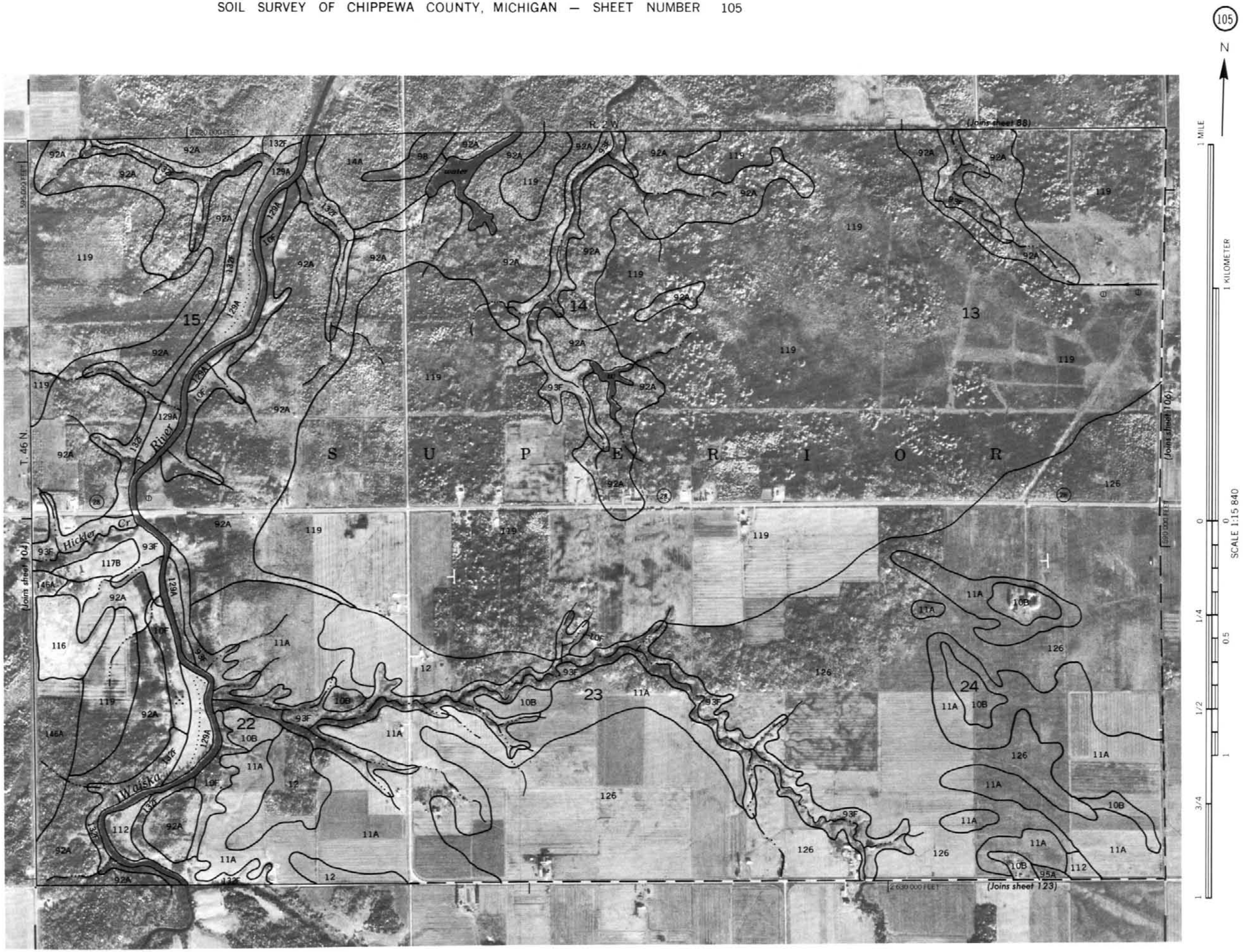
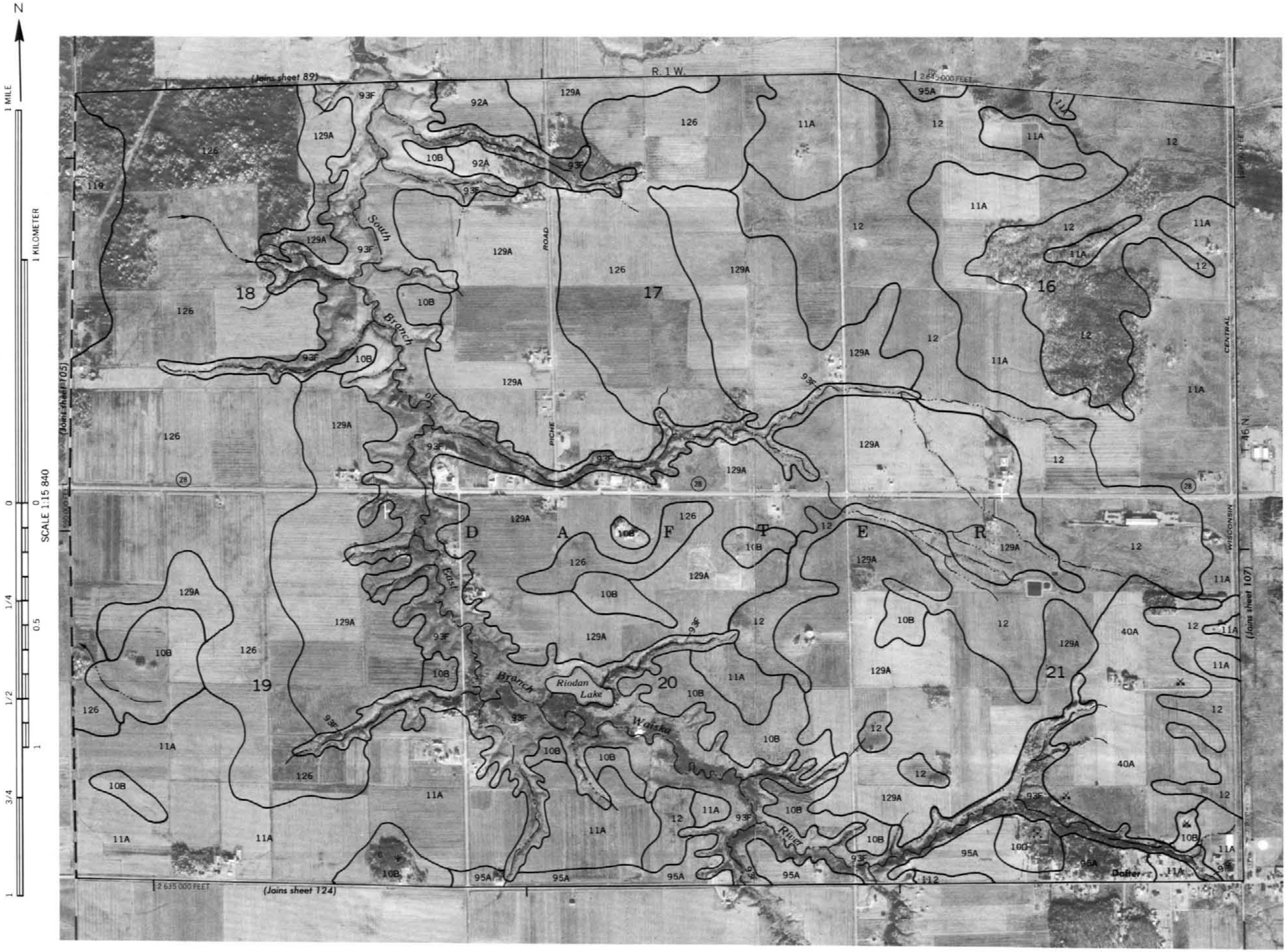
CHIPPEWA COUNTY, MICHIGAN NO. 105


105
N
R. 2 W.
(Joins sheet 88)
(Joins sheet 100)
(Joins sheet 104)
(Joins sheet 123)
T. 46 N.
2 620 000 FEET
2 630 000 FEET
595 000 FEET
590 000 FEET
S U P E R I O R
River
Hickler Cr.
Waiska
water
w
15
14
13
22
23
24
92A
119
132F
129A
10F
14A
98
93F
117B
146A
116
112
11A
10B
12
126
95A
28
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 106


N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840
(Joins sheet 89)
R. 1 W.
2 645 000 FEET
(Joins sheet 105)
(Joins sheet 107)
(Joins sheet 124)
2 635 000 FEET
T. 46 N.
16
17
18
19
20
21
South Branch of East Branch Waiska River
Riodan Lake
D A F T E R
Dafter
PICHE ROAD
CENTRAL
WISCONSIN
28
126
129A
93F
92A
10B
10D
11A
12
95A
40A
119
112

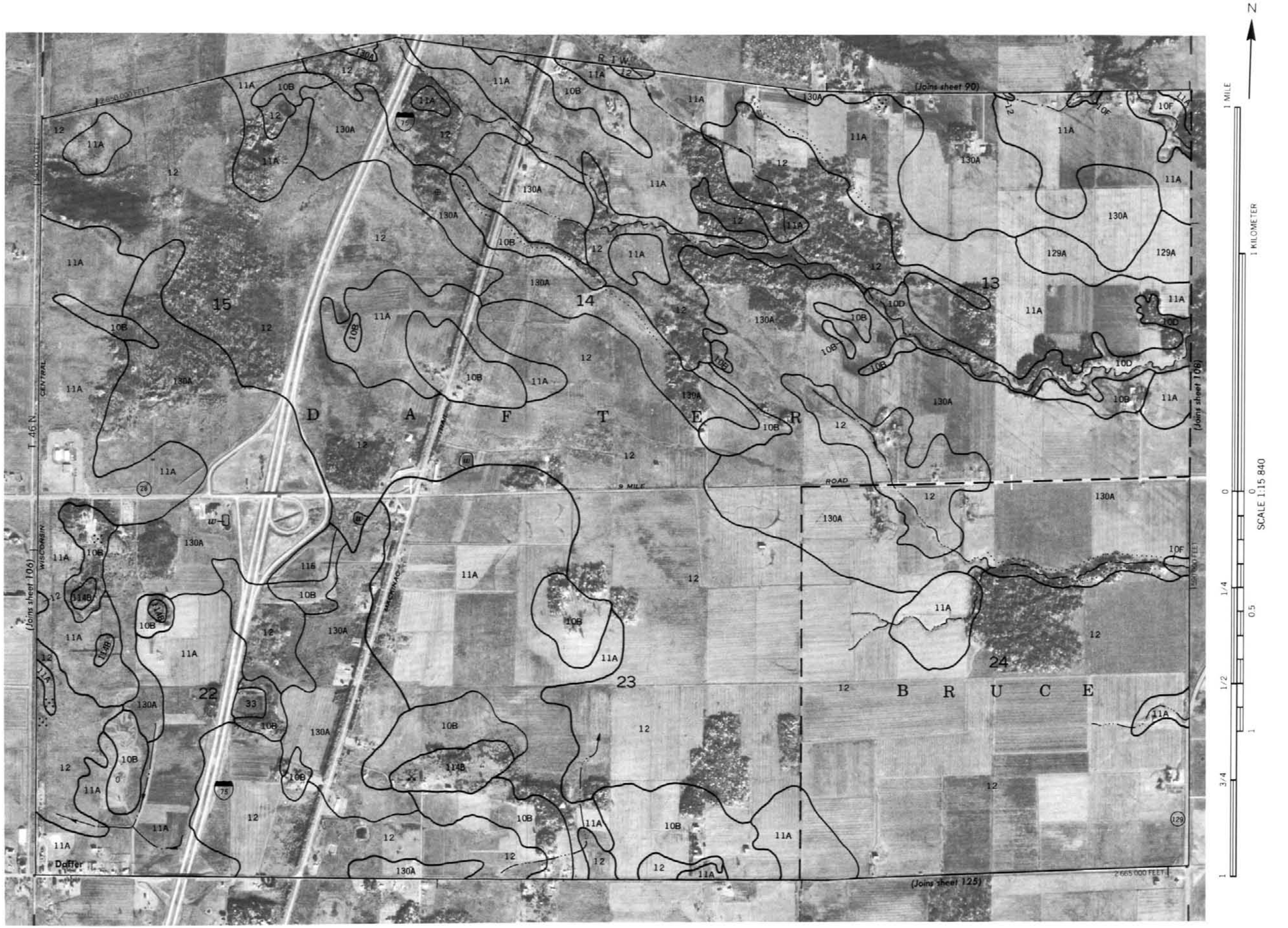
CHIPPEWA COUNTY, MICHIGAN NO. 106

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 107

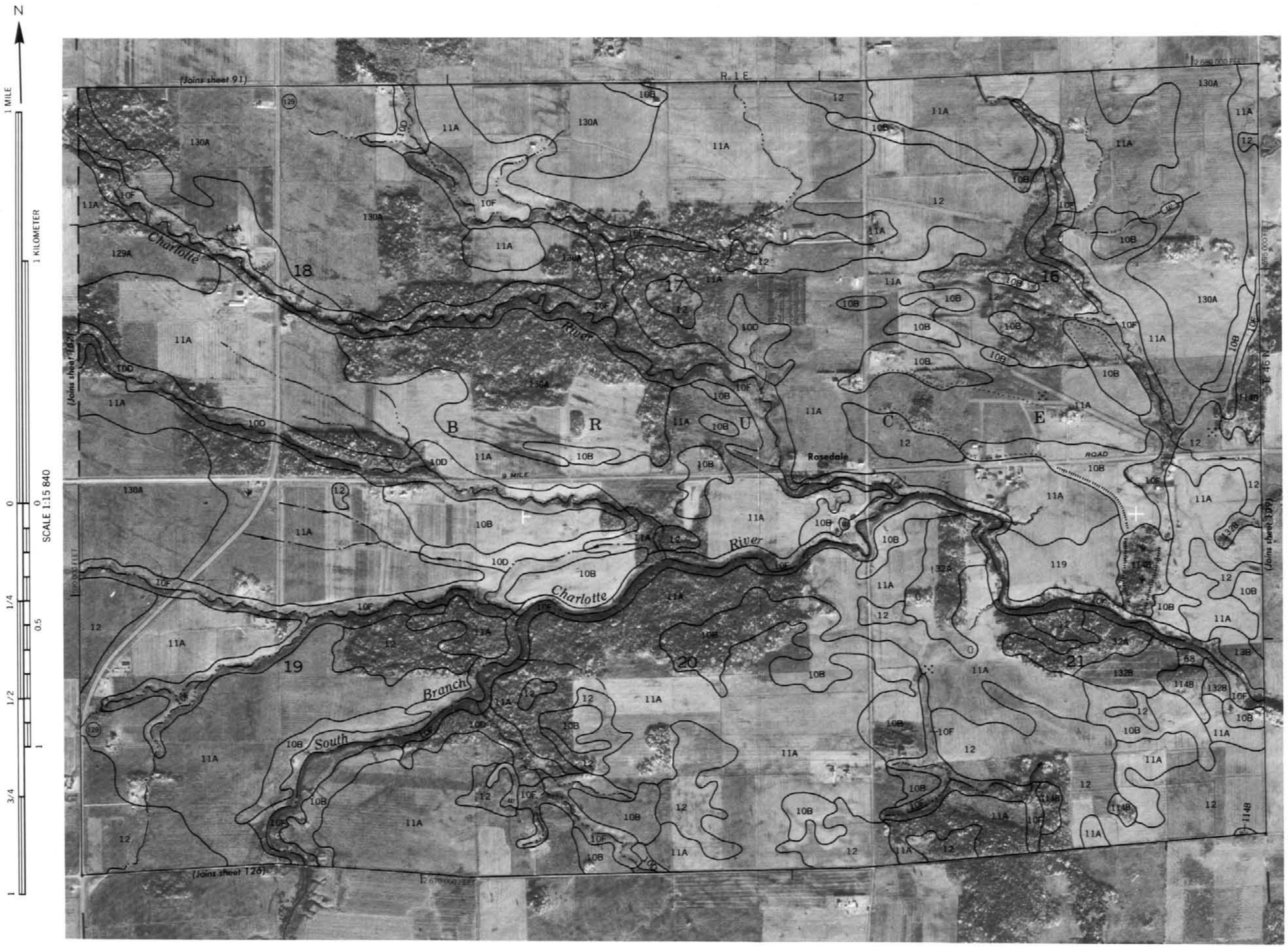
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 107


(Joins sheet 90)
(Joins sheet 106)
(Joins sheet 106)
(Joins sheet 125)
R 1 W
T 46 N
D A F T E R
B R U C E
9 MILE ROAD
CENTRAL
WISCONSIN
MACKINAC
Dafter
2 650 000 FEET
2 665 000 FEET
13
14
15
22
23
24
10B
10D
10F
11A
12
114B
129A
130A
33
75
28
129
N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1

(108)

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 108


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 91)
(Joins sheet 107)
(Joins sheet 109)
(Joins sheet 126)
R. 1 E.
T. 46 N.
2 680 000 FEET
2 670 000 FEET
695 000 FEET
690 000 FEET
129
Charlotte
River
Charlotte
River
South
Branch
Rosedale
9 MILE
ROAD
B
R
U
C
E
16
17
18
19
20
21
130A
129A
11A
10F
10D
10B
12
119
132A
132B
114B
13B
6B
10F

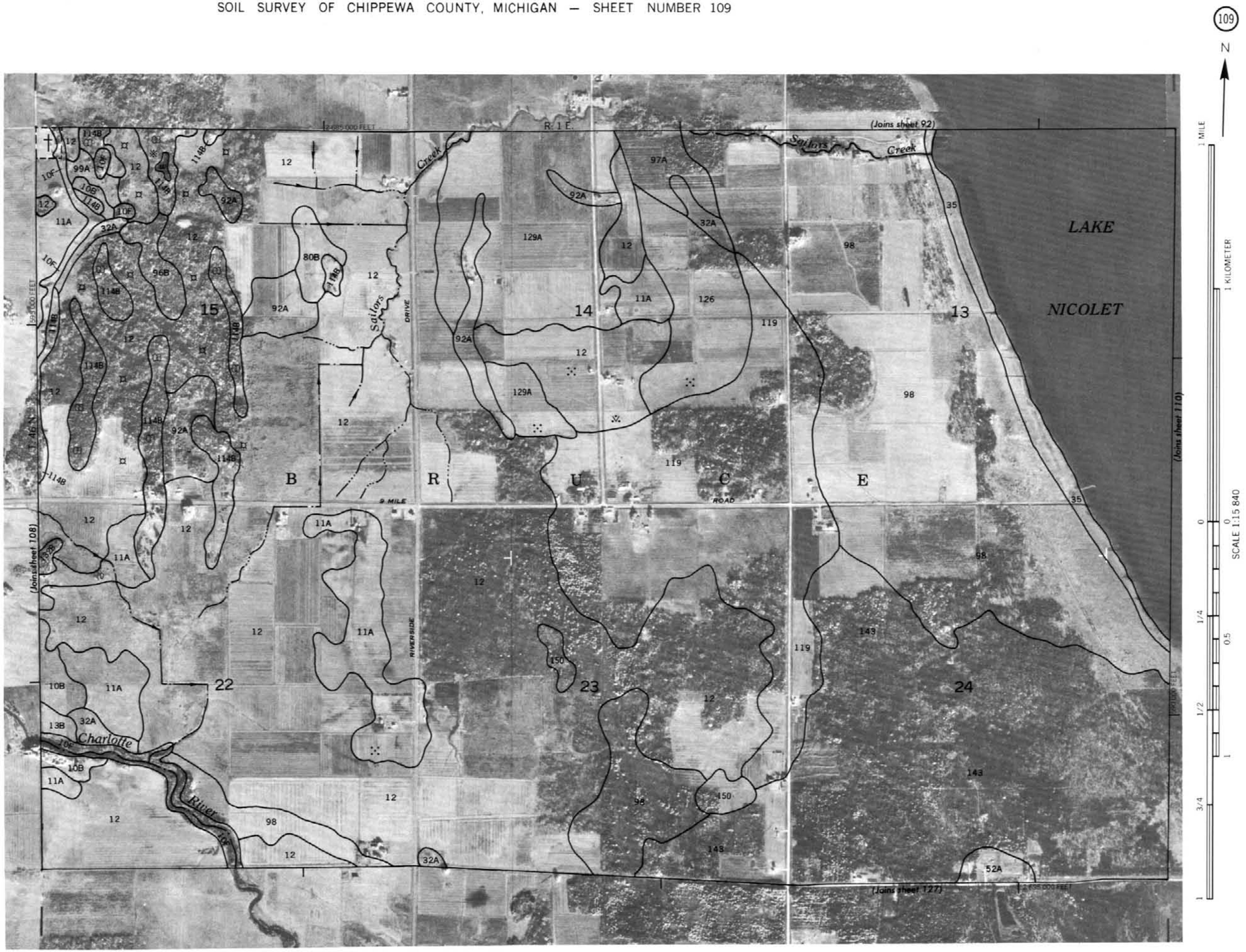
CHIPPEWA COUNTY, MICHIGAN NO. 108

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

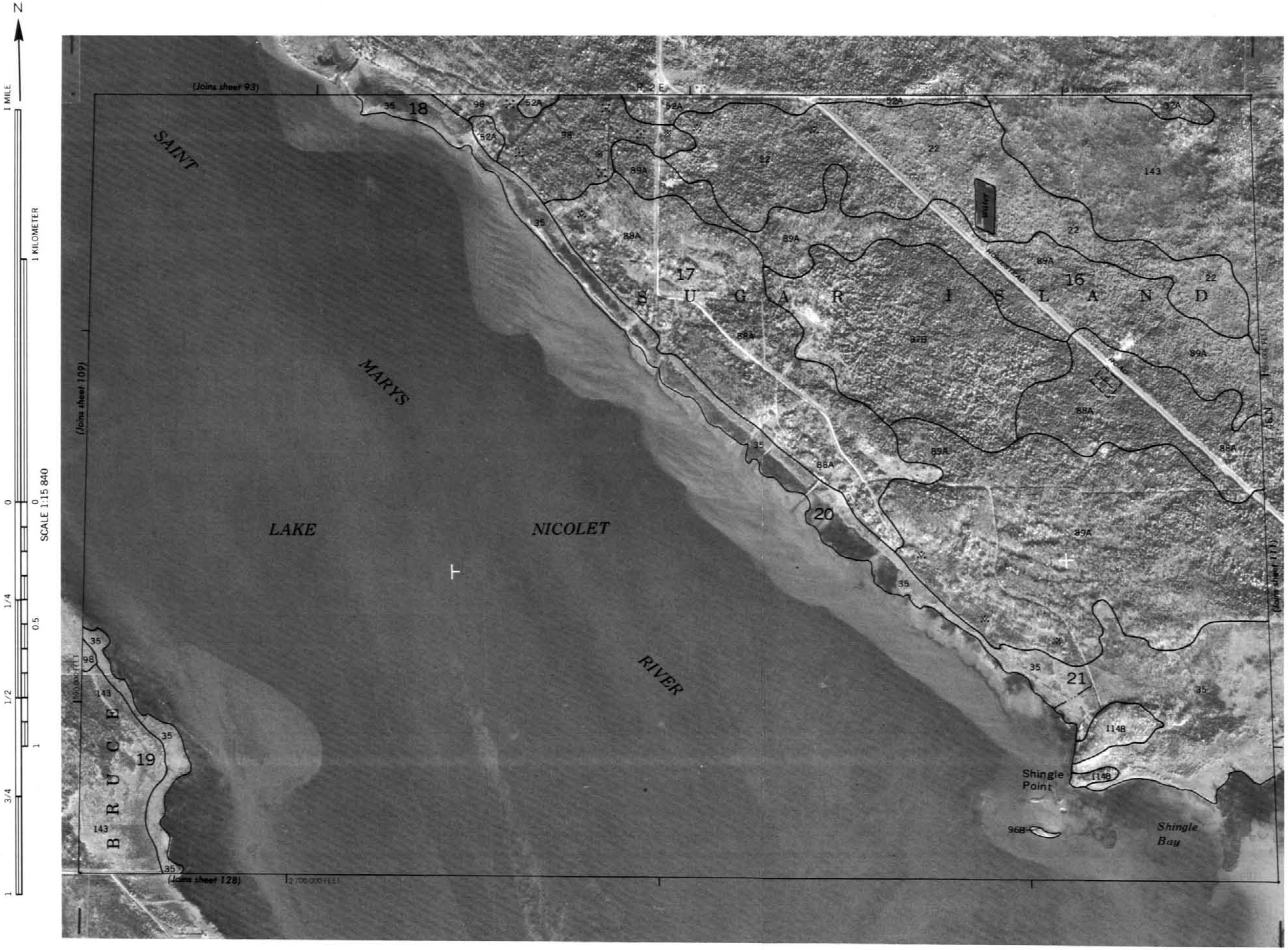
SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 109

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 109


109
N
LAKE
NICOLET
Sailors Creek
Charlotte River
DRIVE
RIVERSIDE
9 MILE ROAD
B R U C E
R. 1 E.
T. 46 N.
(Joins sheet 92)
(Joins sheet 110)
(Joins sheet 127)
(Joins sheet 108)
2 685 000 FEET
2 695 000 FEET
595 000 FEET
15
14
13
22
23
24
12
11A
10B
10F
13B
32A
35
52A
80B
92A
96B
97A
98
99A
114B
119
126
129A
143
148
150
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 110


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 93)
(Joins sheet 109)
(Joins sheet 111)
(Joins sheet 128)
R. 2 E.
SAINT
MARYS
LAKE
NICOLET
RIVER
S U G A R I S L A N D
B R U C E
Shingle Point
Shingle Bay
Water
16
17
18
19
20
21
22
35
52A
88A
89A
87B
98
143
114B
96B
2 700 000 FEET
500 000 FEET

CHIPPEWA COUNTY, MICHIGAN NO. 110

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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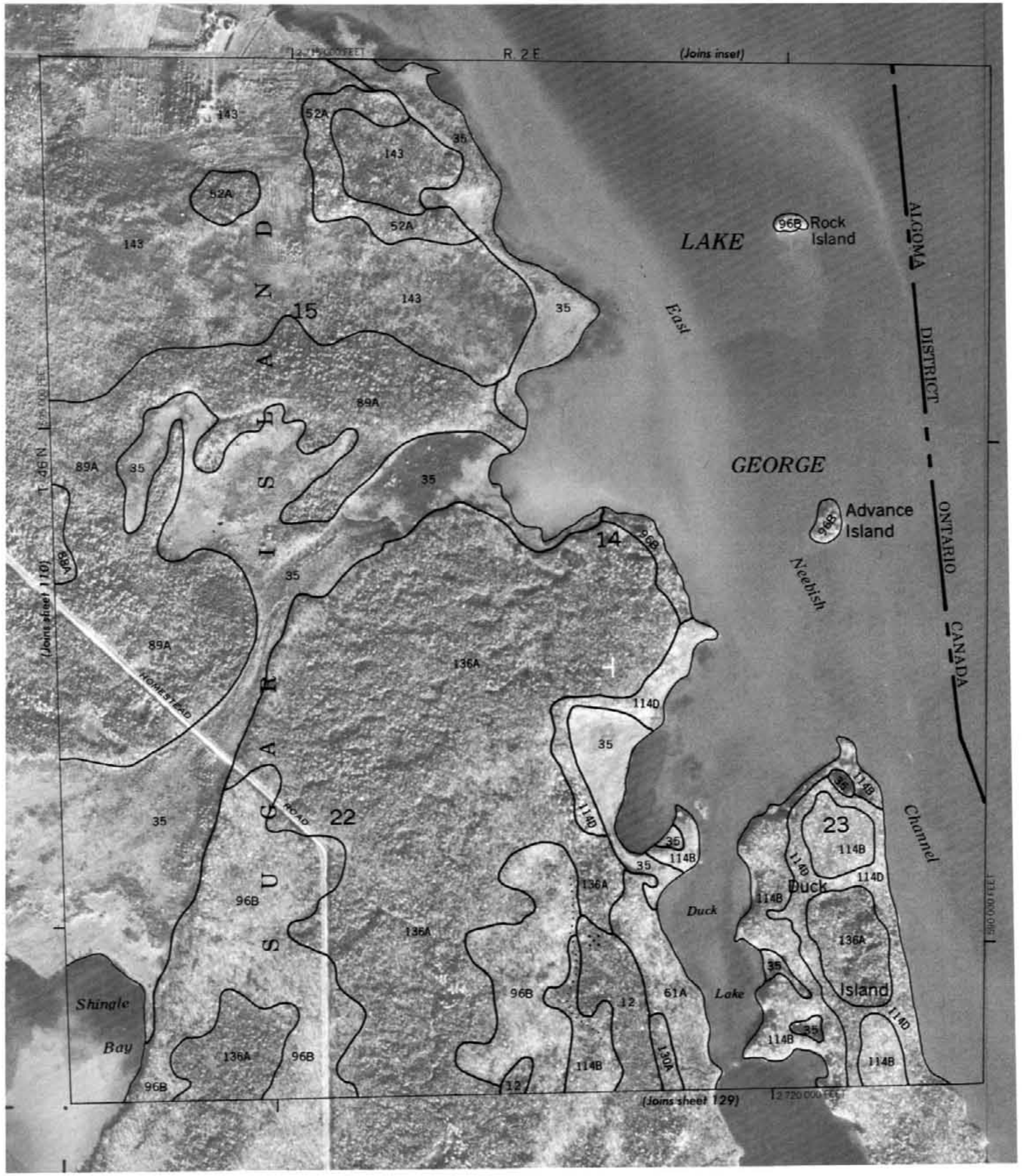
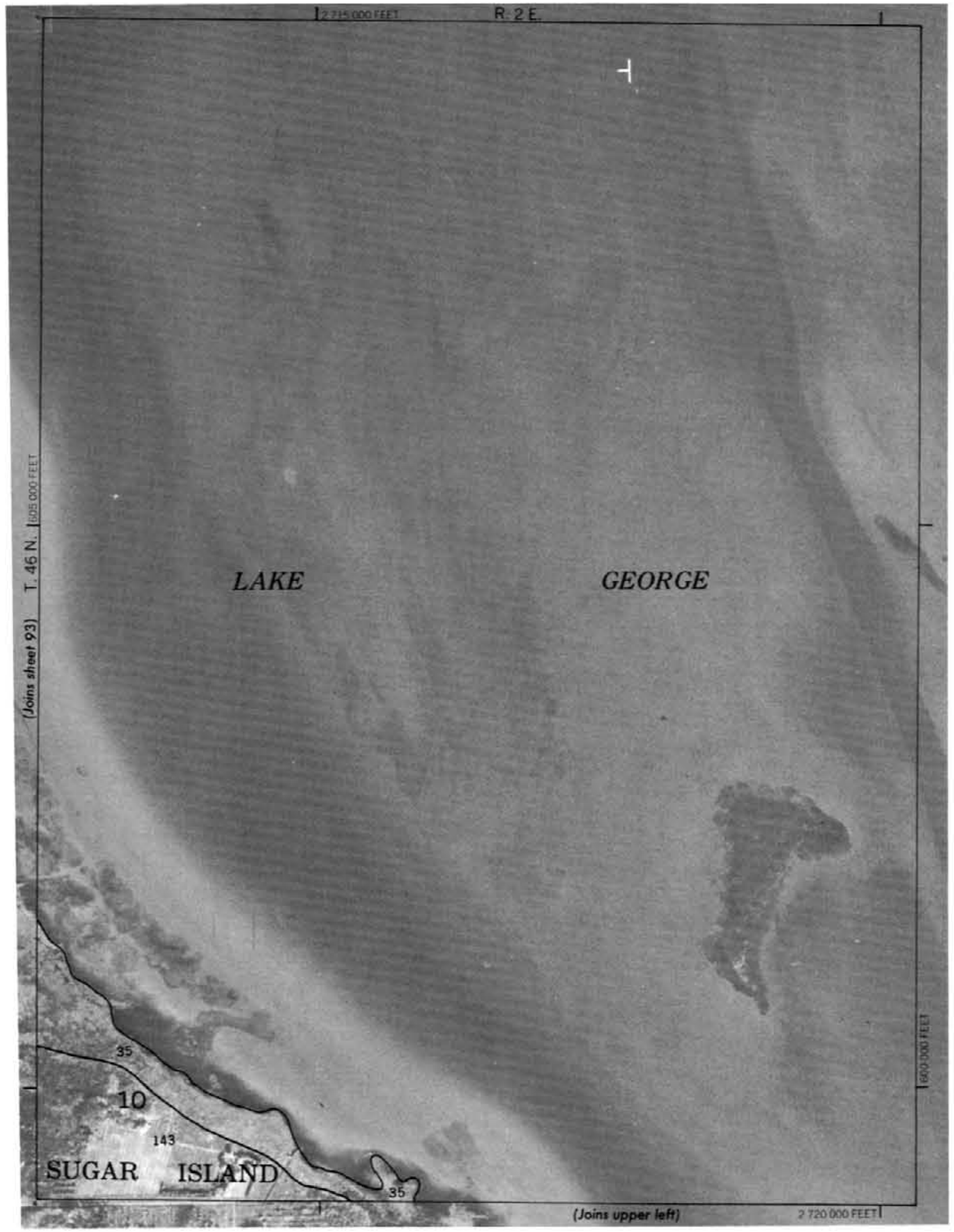
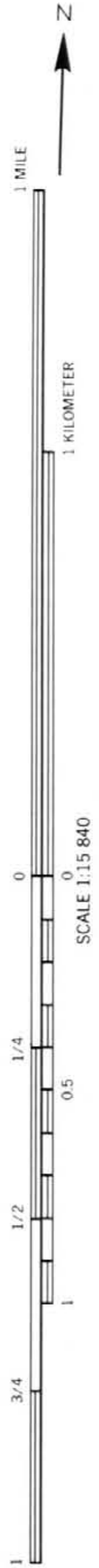
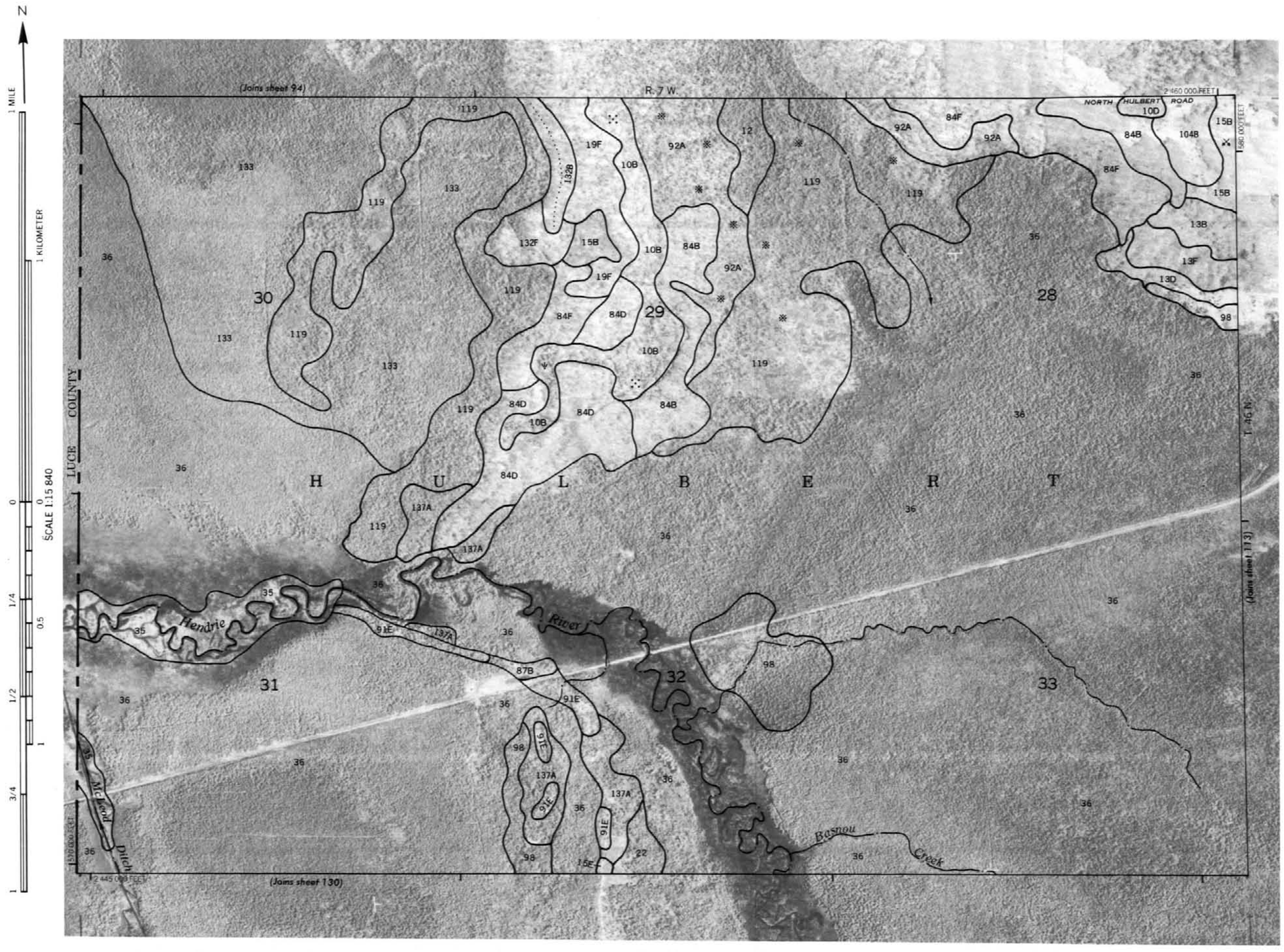
CHIPPEWA COUNTY, MICHIGAN NO. 111


R. 2 E.
(Joins inset)
2 715 000 FEET
143
52A
35
LAKE
96B Rock Island
ALGOMA DISTRICT
ONTARIO CANADA
East
GEORGE
Advance Island
Neebish
Channel
SUGAR ISLAND
15
14
22
23
89A
136A
114D
114B
96B
61A
130A
12
Duck Lake
Duck Island
Shingle Bay
HOMESTEAD ROAD
T. 46 N.
(Joins sheet 110)
(Joins sheet 129)
2 720 000 FEET
600 000 FEET


2 715 000 FEET
R. 2 E.
T. 46 N.
605 000 FEET
(Joins sheet 93)
LAKE
GEORGE
35
10
143
SUGAR ISLAND
(Joins upper left)
2 720 000 FEET
600 000 FEET


N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
SCALE 1:15 840


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 94)
R. 7 W.
2 460 000 FEET
NORTH HULBERT ROAD
560 000 FEET
T. 46 N.
(Joins sheet 113)
(Joins sheet 130)
2 445 000 FEET
370 000 FEET
LUCE COUNTY
H U L B E R T
30
29
28
31
32
33
Hendrie River
McLeod Ditch
Basnau Creek
119
133
36
132B
132F
19F
10B
92A
12
84F
84B
104B
10D
15B
13B
13F
13D
98
84D
15B
35
137A
91E
87B
22
15E

CHIPPEWA COUNTY, MICHIGAN NO. 112

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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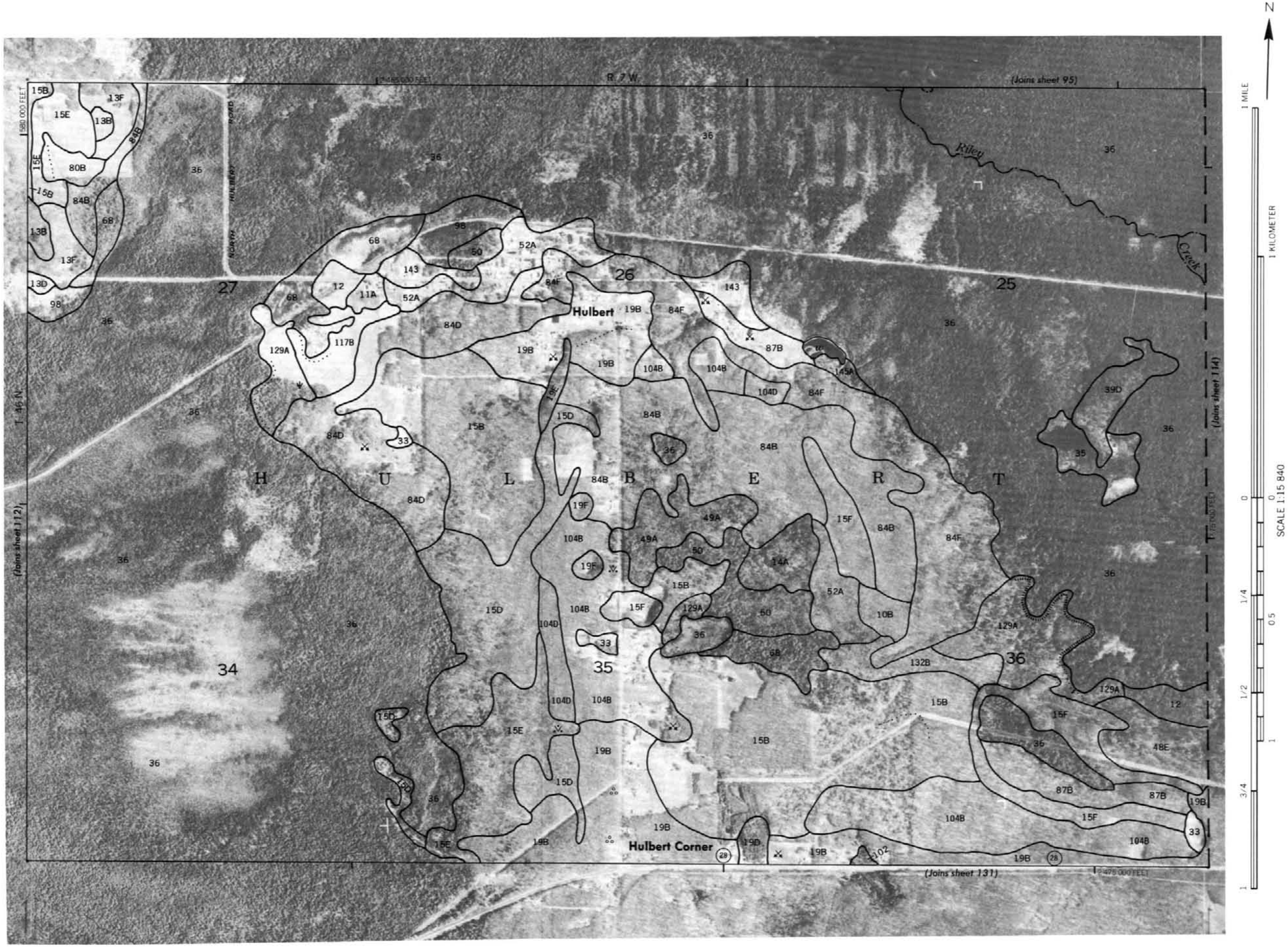
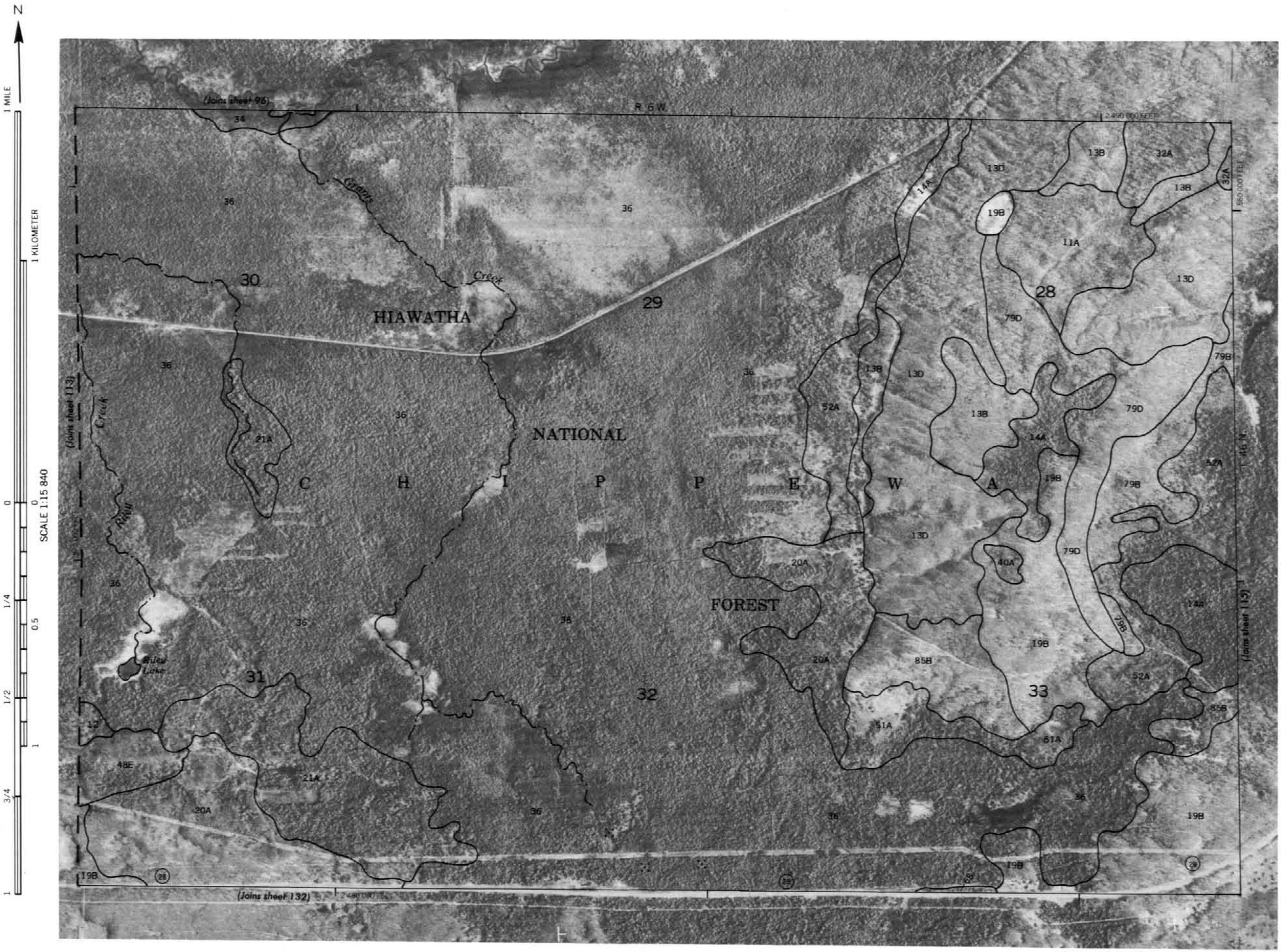
CHIPPEWA COUNTY, MICHIGAN NO. 113


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
R. 7 W.
T. 46 N.
(Joins sheet 95)
(Joins sheet 114)
(Joins sheet 131)
(Joins sheet 112)
2 465 000 FEET
2 475 000 FEET
580 000 FEET
570 000 FEET
NORTH HULBERT ROAD
Riley Creek
Hulbert
Hulbert Corner
H U L B E R T
27
26
25
34
35
36
28
15B
15E
13F
13B
84B
80B
6B
13D
9B
36
68
98
60
52A
143
12
11A
84F
19B
117B
129A
84D
33
15D
15F
19F
19E
104B
104D
87B
145A
39D
35
49A
14A
10B
52A
132B
12
48E
15B
102
19D

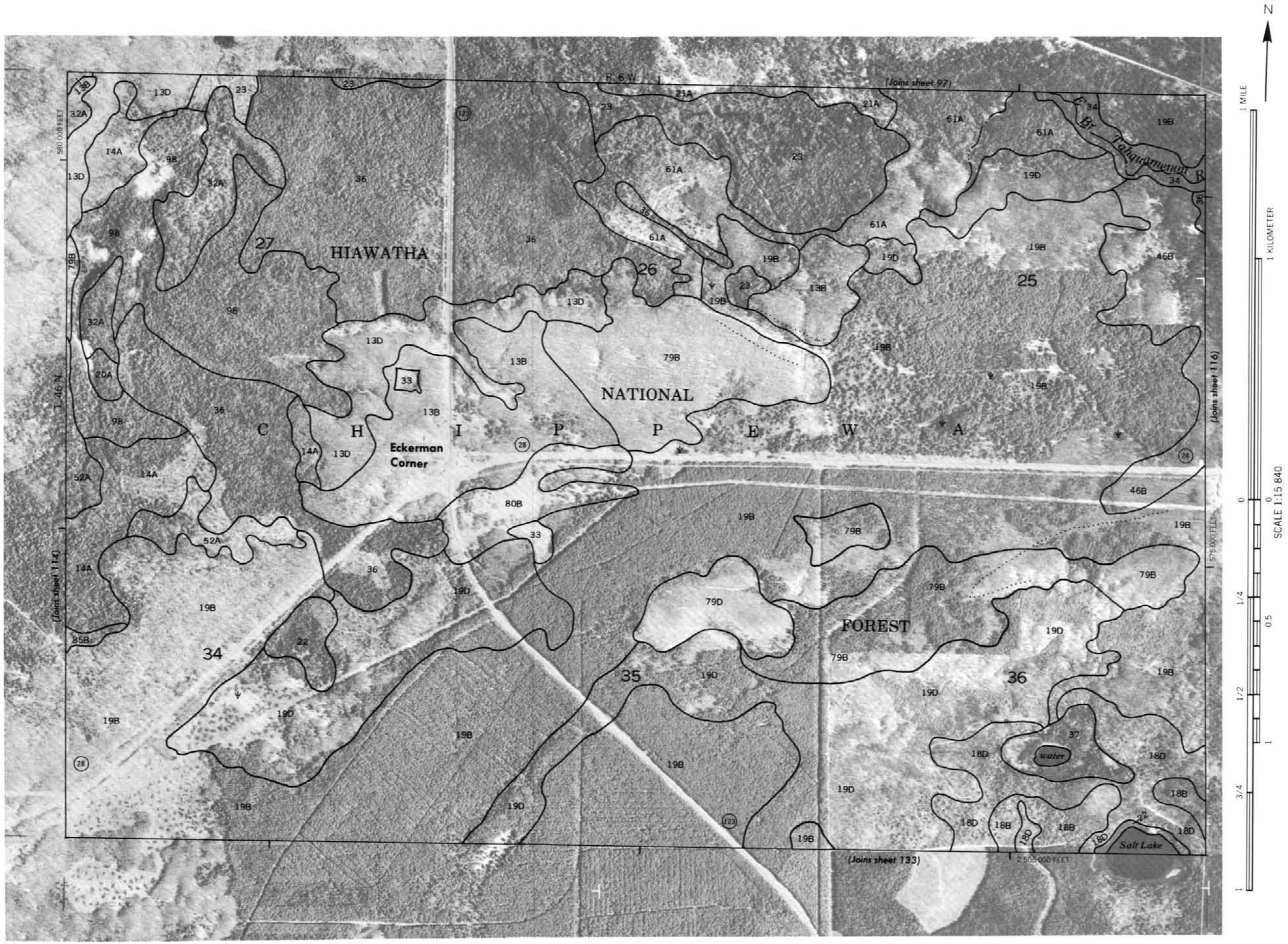
(114)

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 114


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 96)
R. 6 W.
(Joins sheet 113)
(Joins sheet 115)
(Joins sheet 132)
T. 46 N.
HIAWATHA
NATIONAL
C H I P P E W A
FOREST
Grants Creek
Creek
Riley Creek
Riley Lake
28
29
30
31
32
33
34
36
21A
12
48E
20A
19B
52A
13B
13D
14A
11A
32A
79D
79B
40A
85B
51A
28

CHIPPEWA COUNTY, MICHIGAN NO. 114

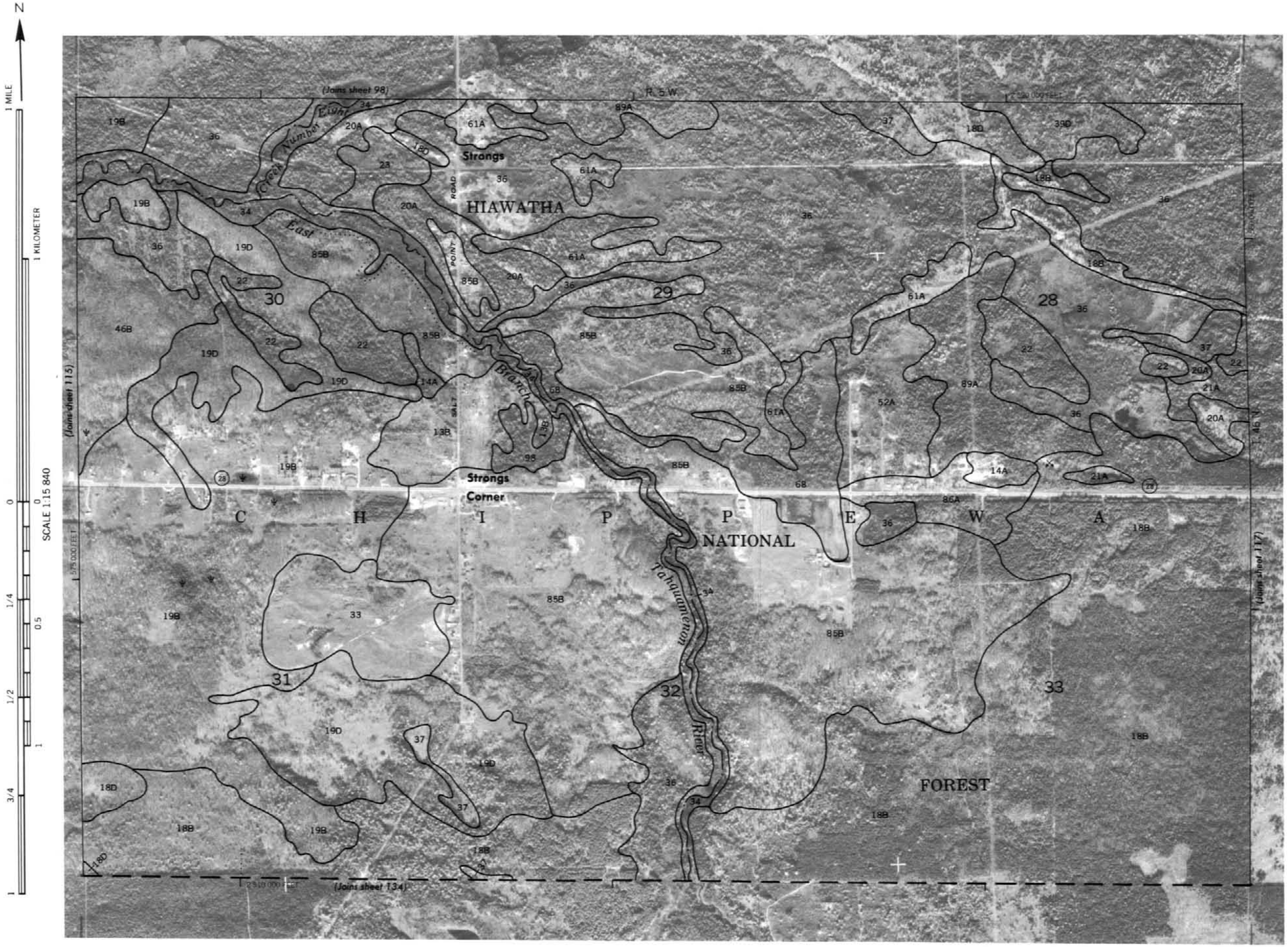
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 97)
(Joins sheet 116)
(Joins sheet 133)
(Joins sheet 114)
R. 6 W.
T. 46 N.
2 495 000 FEET
2 505 000 FEET
580 000 FEET
575 000 FEET
HIAWATHA
NATIONAL
FOREST
C H I P P E W A
Eckerman Corner
E. Br. Tahquamenon R.
Salt Lake
water
27
26
25
34
35
36
123
28
13B
13D
14A
18B
18D
19B
19D
20A
21A
22
23
32A
33
34
36
37
46B
52A
61A
79B
79D
80B
85B
98

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

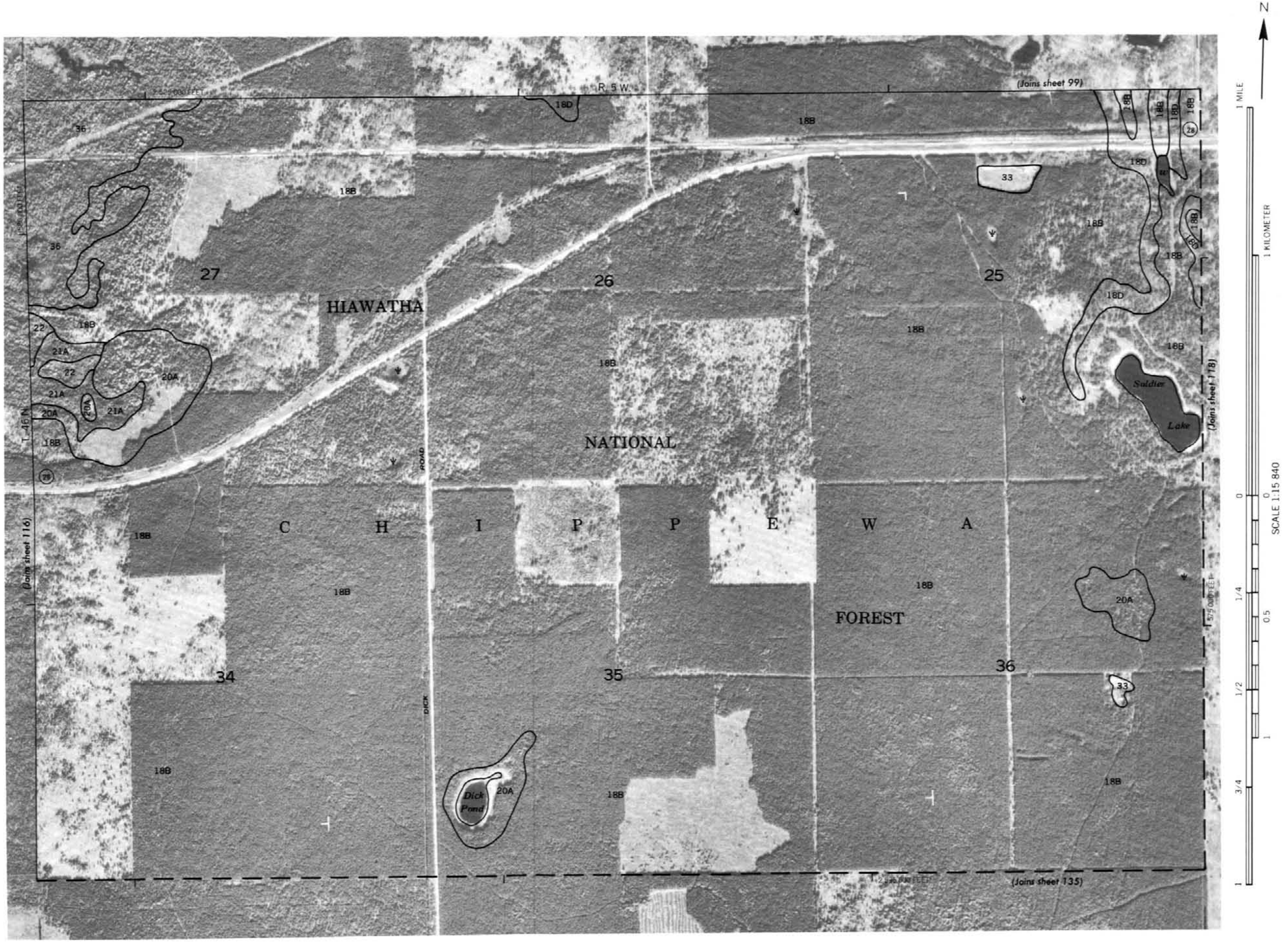
CHIPPEWA COUNTY, MICHIGAN NO. 115

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 116


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 98)
R. 5 W.
(Joins sheet 115)
(Joins sheet 117)
(Joins sheet 134)
2 510 000 FEET
575 000 FEET
Strongs
ROAD
HIAWATHA
POINT
SALT
Strongs
Corner
C H I P P E W A
NATIONAL
FOREST
Creek Number Eight
East
Branch
Tahquamenon
River
19B
36
34
20A
61A
89A
18D
23
37
39D
18B
30
19D
85B
22
29
28
46B
14A
6B
13B
98
68
61A
52A
21A
20A
86A
33
31
32
18D
18B
19B
37
19D
28

CHIPPEWA COUNTY, MICHIGAN NO. 116

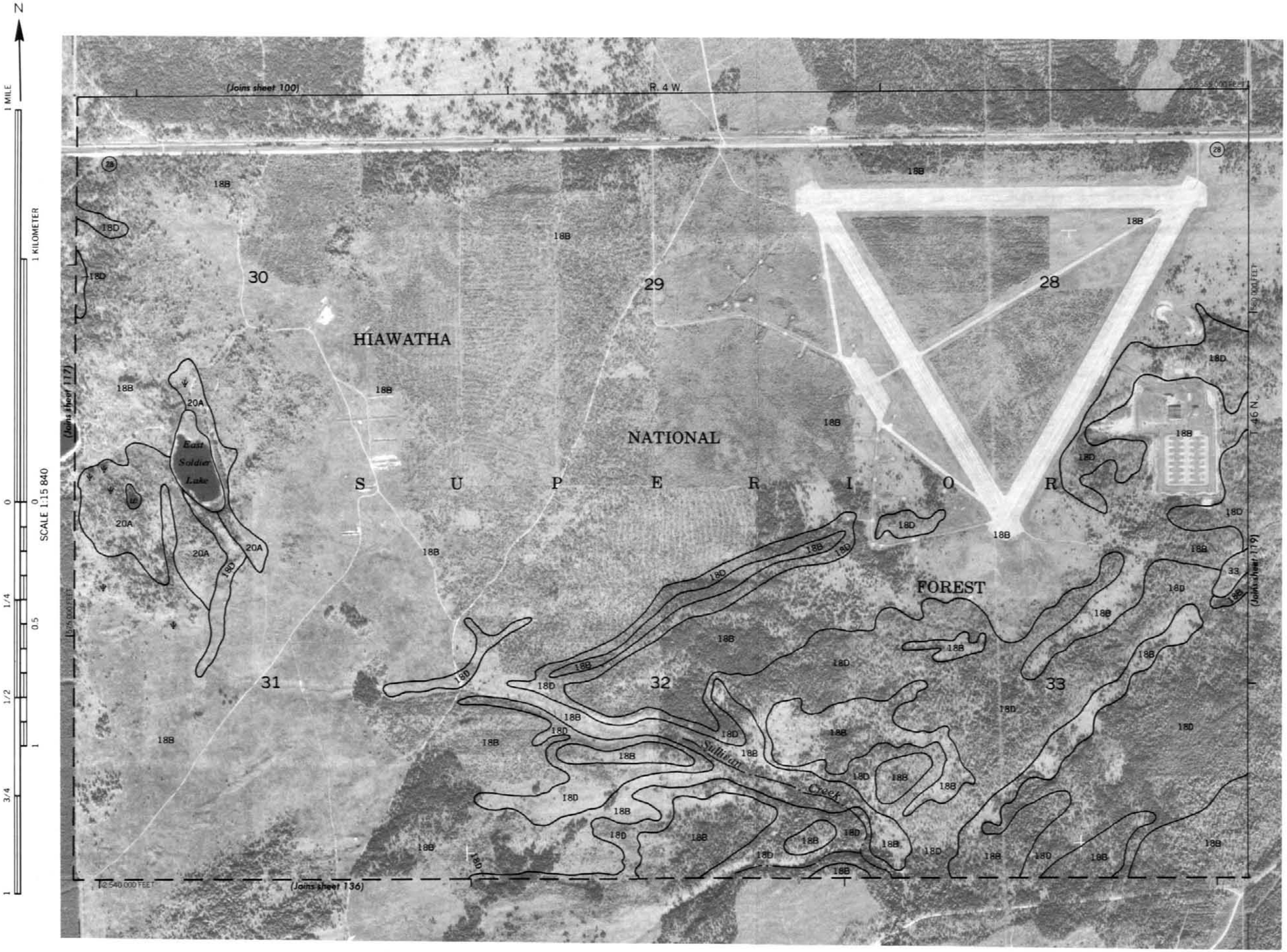
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


117
N
R. 5 W.
(Joins sheet 99)
(Joins sheet 116)
(Joins sheet 118)
(Joins sheet 135)
T. 46 N.
HIAWATHA
NATIONAL
C H I P P E W A
FOREST
DICK ROAD
Soldier Lake
Dick Pond
27
26
25
34
35
36
18B
18D
20A
21A
22
28
33
36
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 117

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 118


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 100)
R. 4 W.
(Joins sheet 117)
(Joins sheet 119)
(Joins sheet 136)
T. 46 N.
2 540 000 FEET
375 000 FEET
380 000 FEET
28
HIAWATHA
NATIONAL
SUPERIOR
FOREST
East Soldier Lake
Sullivan Creek
30
29
28
31
32
33
18B
18D
20A
33

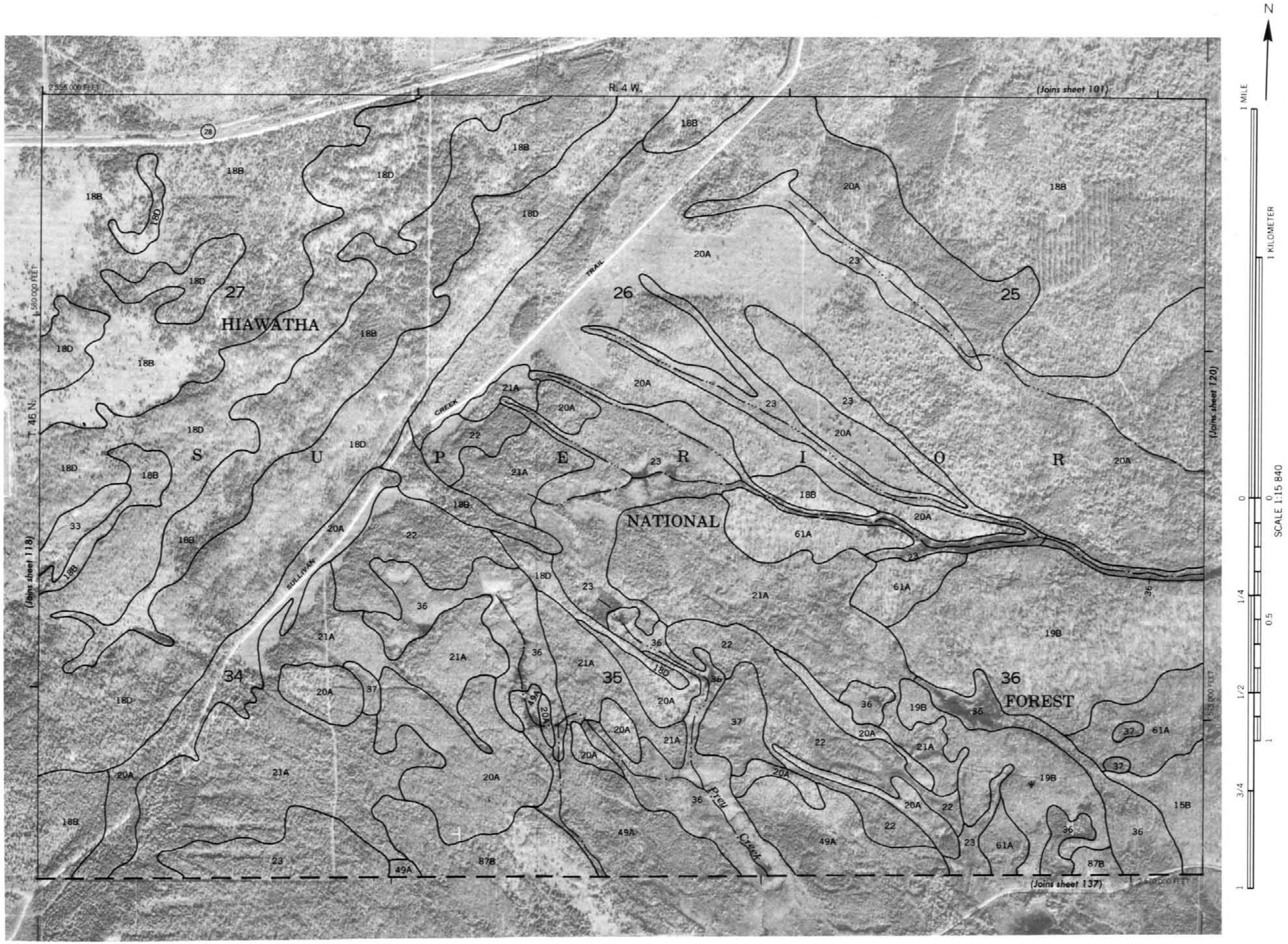
CHIPPEWA COUNTY, MICHIGAN NO. 118

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

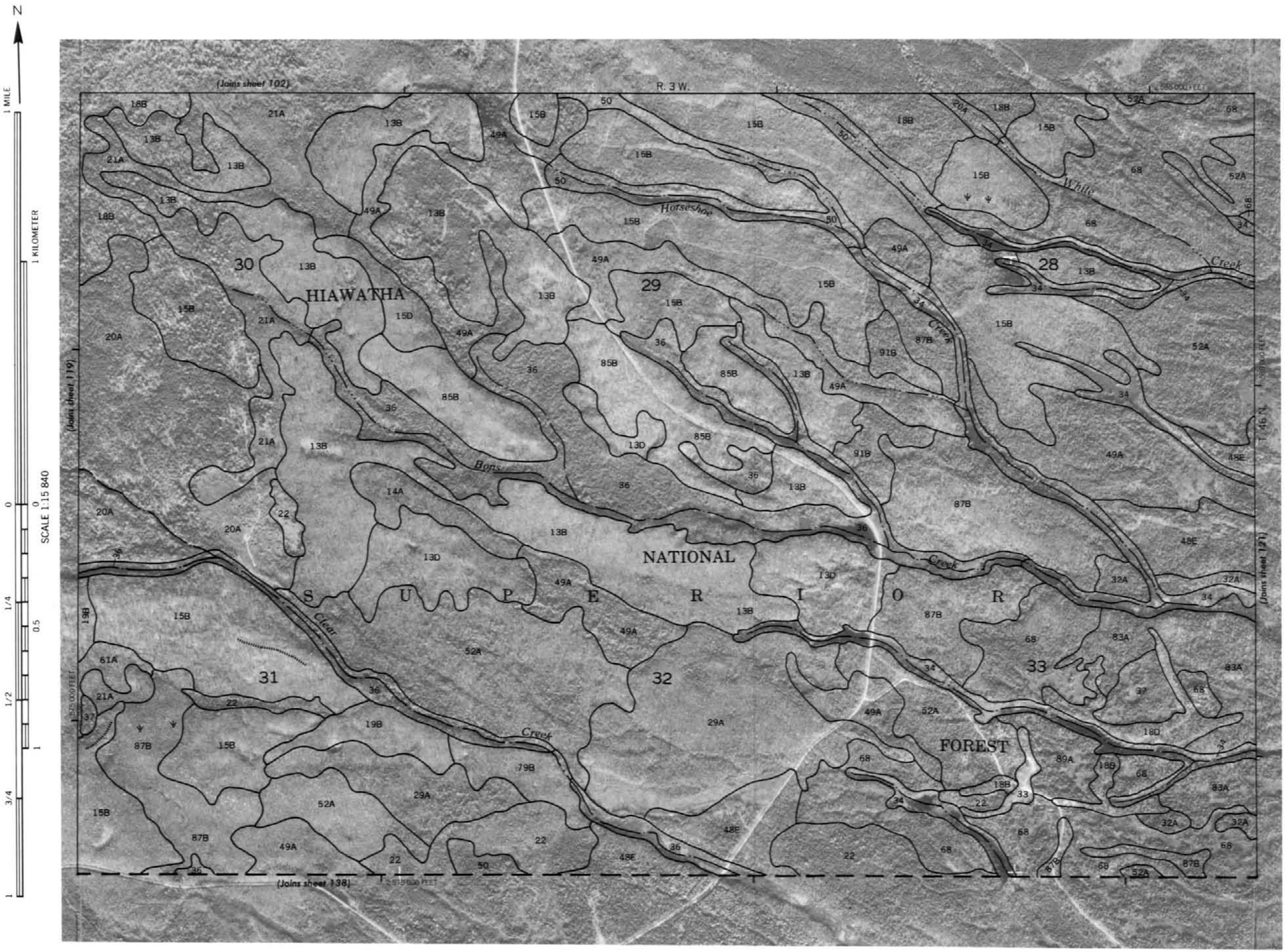
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 119

(119)


2 555 000 FEET
R. 4 W.
(Joins sheet 101)
28
580 000 FEET
T. 46 N.
(Joins sheet 118)
(Joins sheet 120)
(Joins sheet 137)
2 570 000 FEET
525 000 FEET
HIAWATHA
NATIONAL
FOREST
S U P E R I O R
27
26
25
34
35
36
TRAIL
CREEK
SULLIVAN
Prell Creek
18B
18D
19B
20A
21A
22
23
33
36
37
49A
61A
87B
15B
N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 120

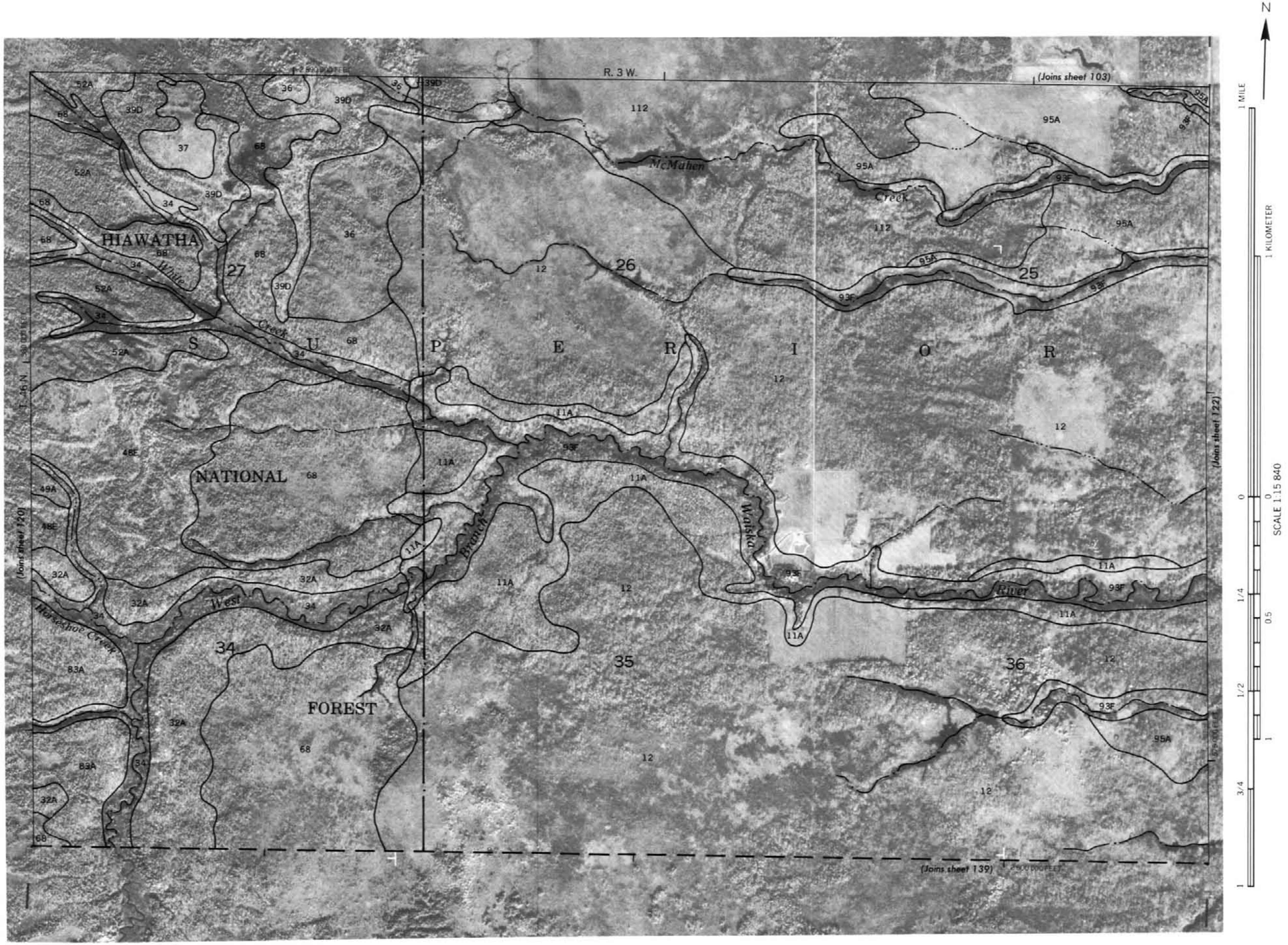

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
(Joins sheet 102)
R. 3 W.
(Joins sheet 119)
(Joins sheet 121)
(Joins sheet 138)
T. 46 N.
HIAWATHA
NATIONAL
S U P E R I O R
FOREST
Horseshoe
White Creek
Creek
Bons
Creek
Clear Creek
28
29
30
31
32
33
13B
15B
15D
18B
21A
20A
49A
85B
36
14A
13D
52A
29A
87B
48E
68
34
50
91B
32A
83A
37
22
19B
61A
79B
89A
18D
33

CHIPPEWA COUNTY, MICHIGAN NO. 120

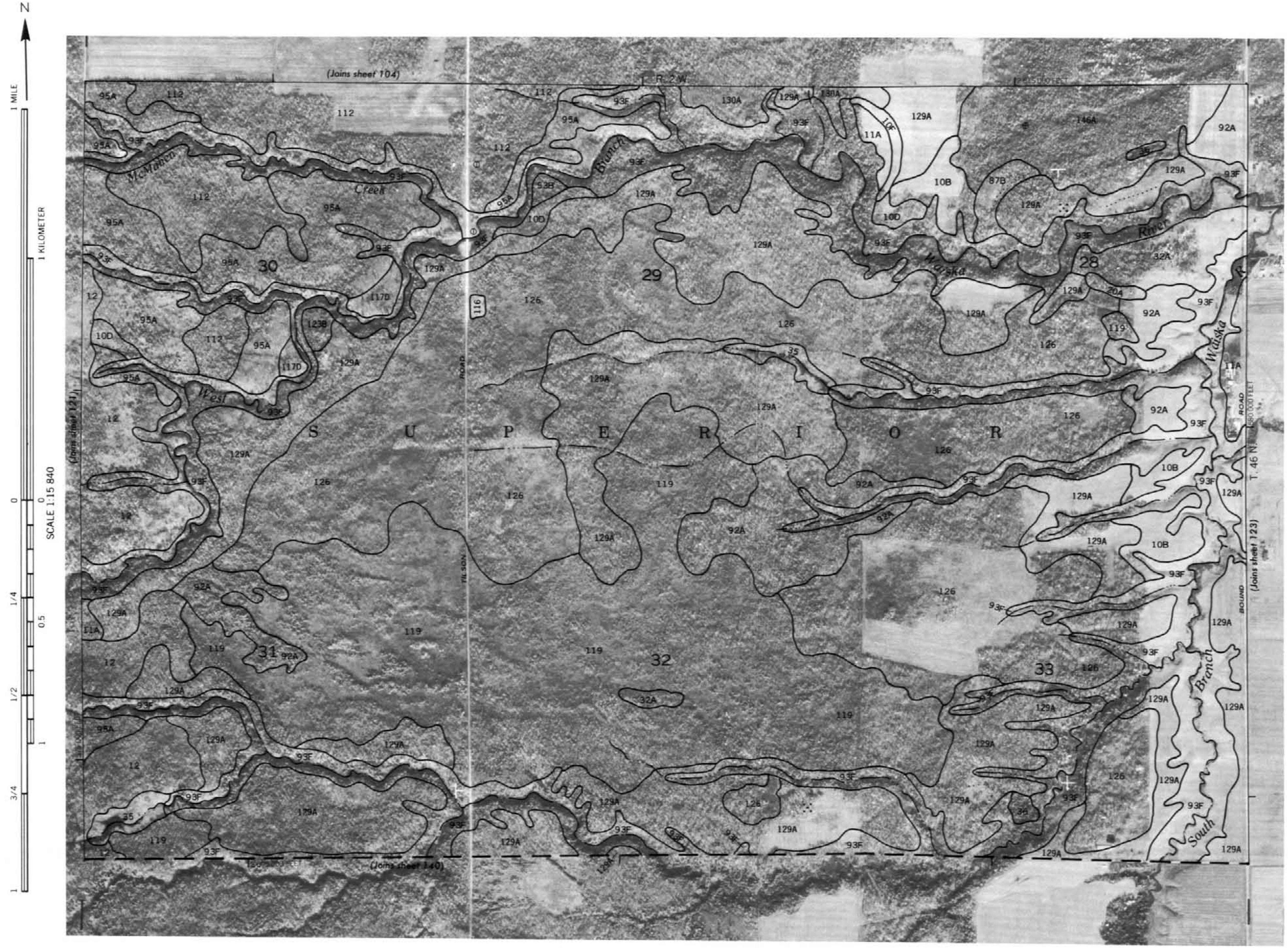
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 121


N
R. 3 W.
(Joins sheet 103)
(Joins sheet 122)
(Joins sheet 139)
(Joins sheet 120)
T. 46 N.
HIAWATHA
NATIONAL
FOREST
S U P E R I O R
White Creek
McMahon Creek
West Branch
Waiska River
Horseshoe Creek
27
26
25
34
35
36
52A
39D
36
37
68
34
39D
112
95A
93F
12
11A
48E
49A
32A
83A
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 122


N
1 MILE
1 KILOMETER
0
0
SCALE 1:15 840
1/4
0.5
1/2
1
3/4
1
(Joins sheet 104)
R. 2 W.
McMahon Creek
Branch
Waiska River
Waiska
West
S U P E R I O R
TILSON ROAD
116
BOUND ROAD
South Branch
T. 46 N.
(Joins sheet 121)
(Joins sheet 123)
(Joins sheet 140)
28
29
30
31
32
33
10B
10D
11A
12
32A
35
53B
87B
92A
93F
95A
112
117D
119
123B
126
129A
130A
146A

CHIPPEWA COUNTY, MICHIGAN NO. 122

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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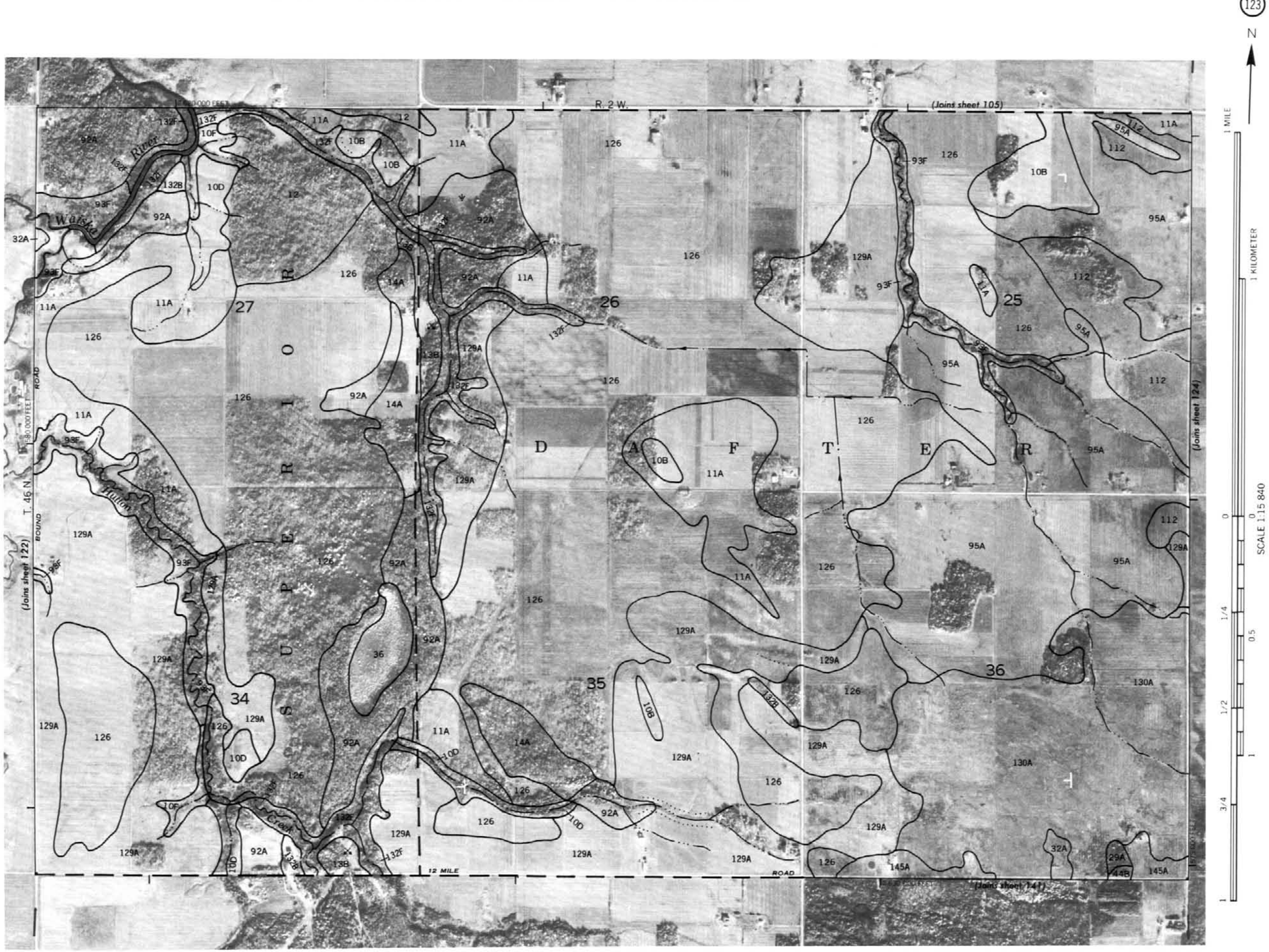
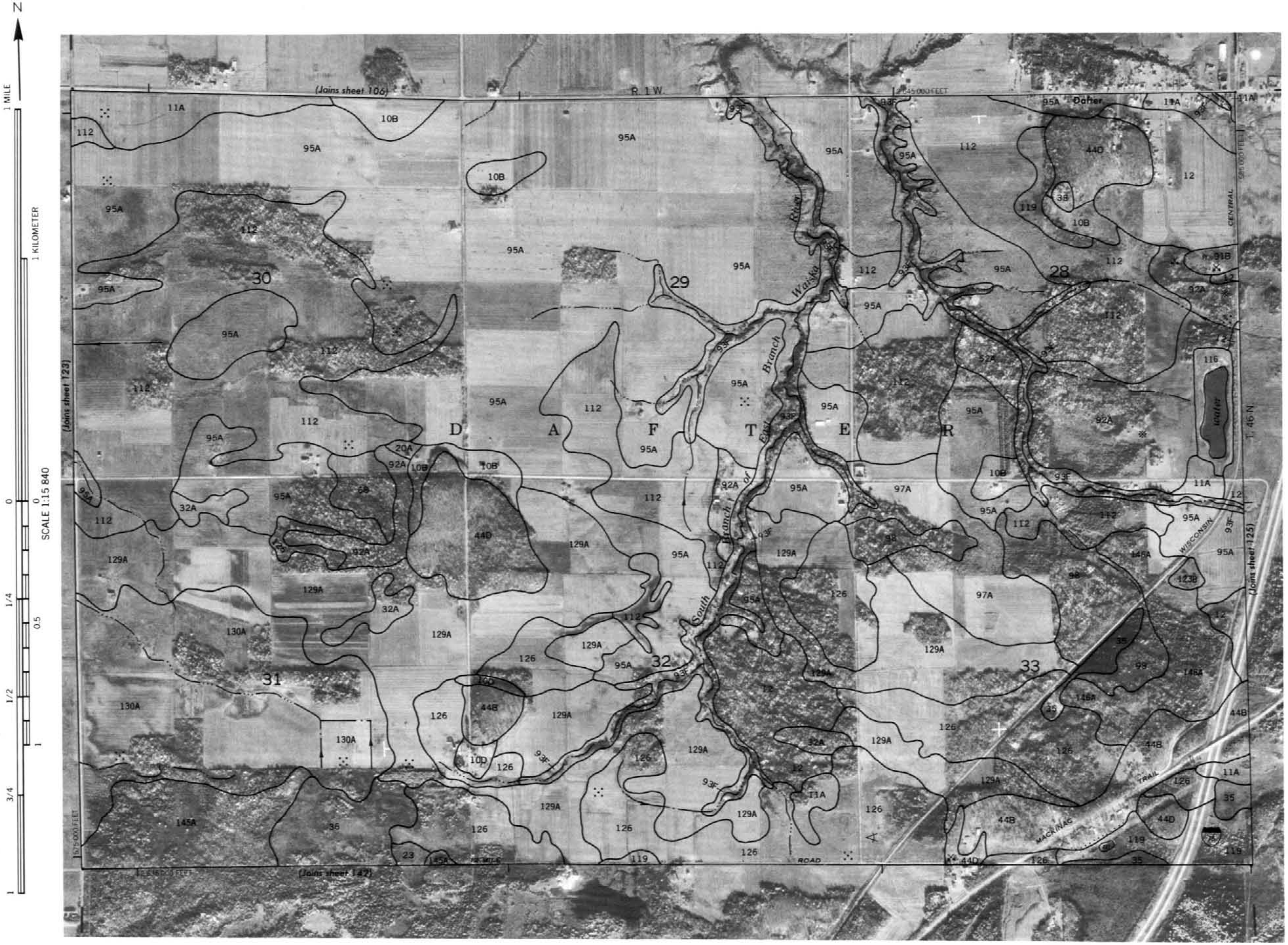
CHIPPEWA COUNTY, MICHIGAN NO. 123

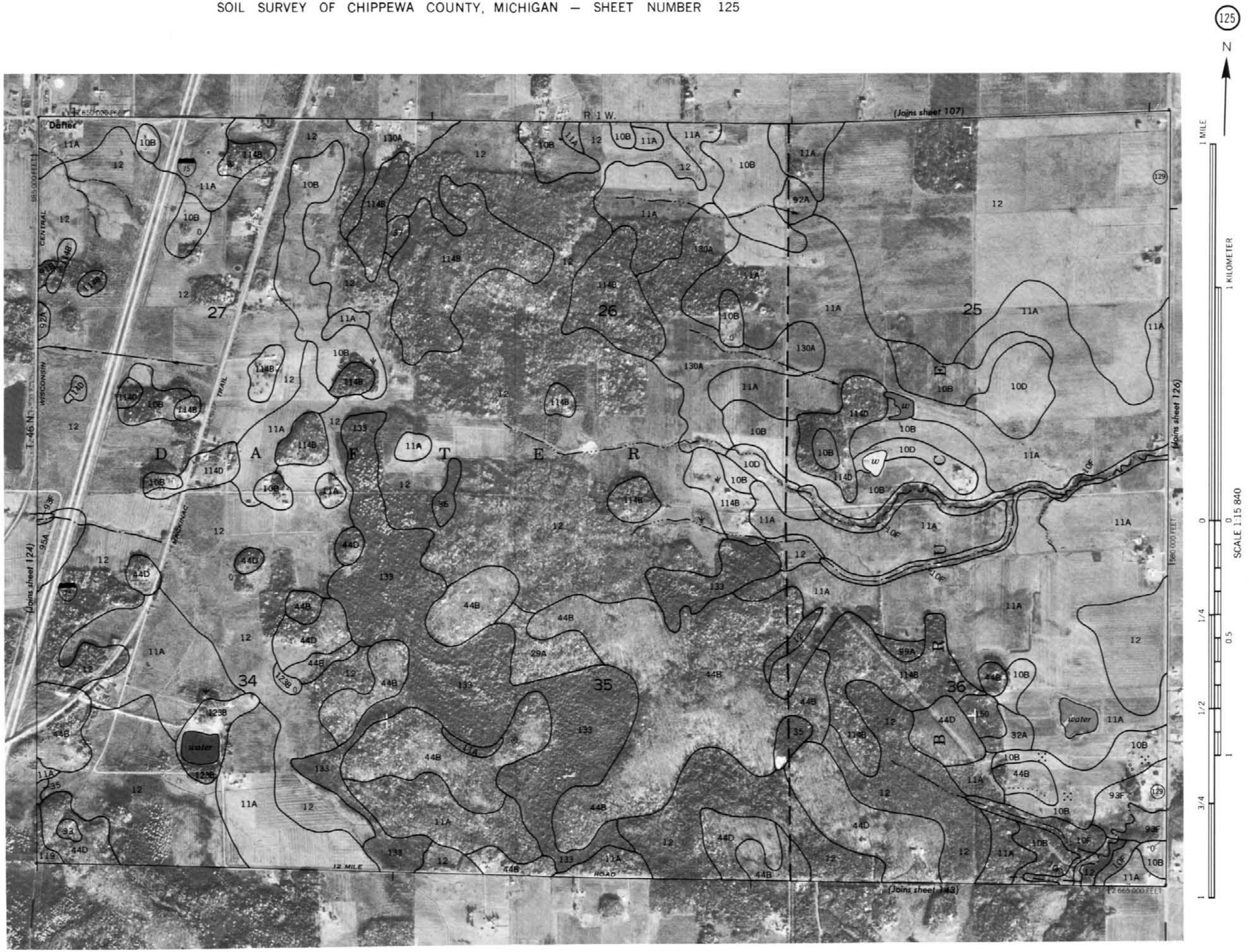

123
N
R. 2 W.
(Joins sheet 105)
(Joins sheet 124)
(Joins sheet 141)
(Joins sheet 122)
T. 46 N.
BOUND ROAD
12 MILE ROAD
Waiska River
Hulton Creek
SUPERIOR
DAFTER
27
26
25
34
35
36
11A
12
10B
10D
10F
14A
13B
32A
29A
44B
92A
93F
95A
112
126
129A
130A
132B
132F
145A
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 124


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 106)
(Joins sheet 123)
(Joins sheet 125)
(Joins sheet 142)
R. 1 W.
T. 46 N.
D A F T E R
Dafter
28
29
30
31
32
33
Waiska River
East Branch
South Branch of East Branch
water
CENTRAL
WISCONSIN
MACKINAC TRAIL
ROAD
11A
10B
112
95A
44D
38
119
12
91B
92A
116
11A
97A
93F
129A
126
44B
130A
145A
36
23
35
10D
32A
20A
98
146A
123B
32A

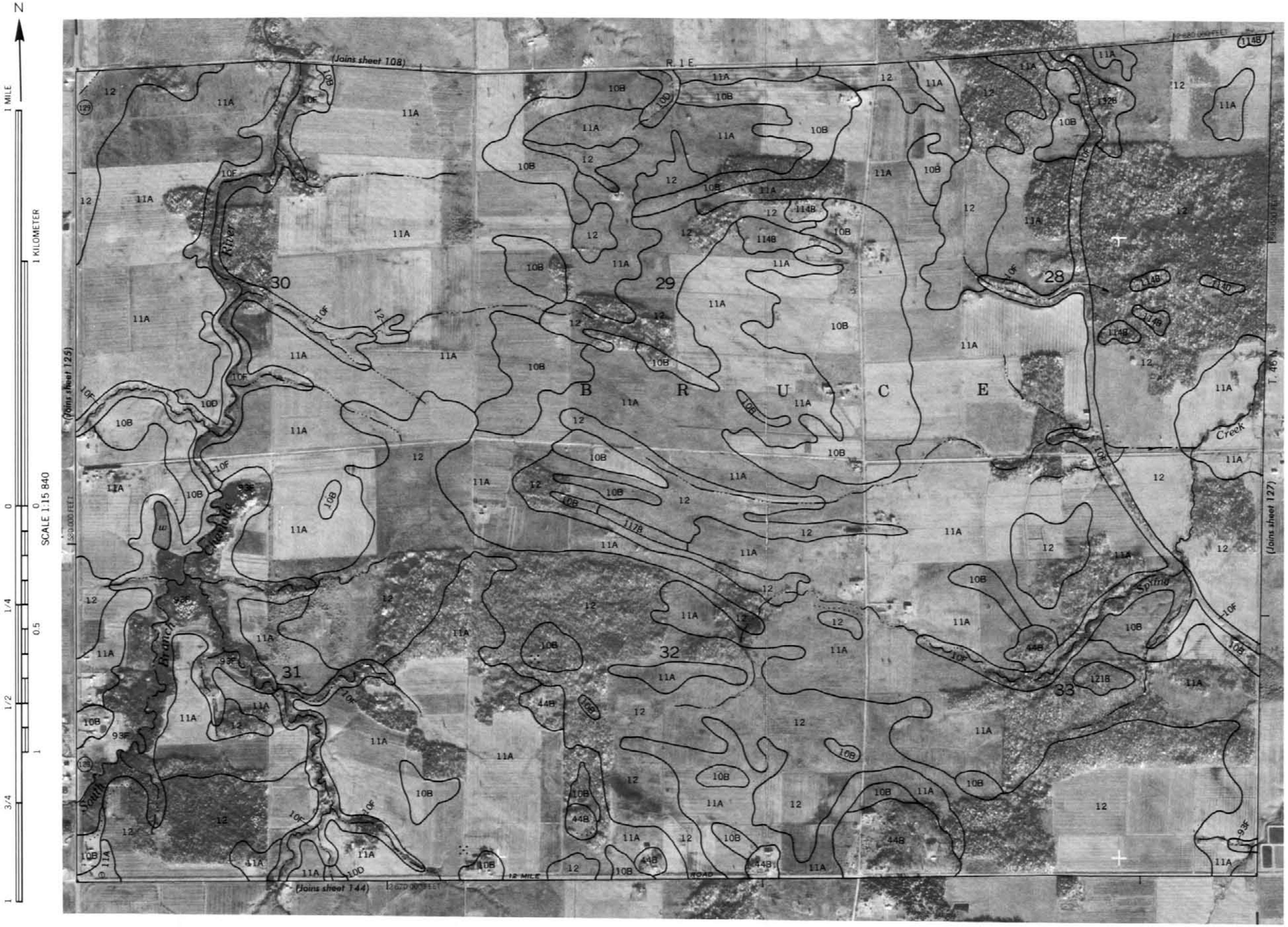
CHIPPEWA COUNTY, MICHIGAN NO. 124

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


125
N
R. 1 W.
(Joins sheet 107)
(Joins sheet 126)
(Joins sheet 143)
(Joins sheet 124)
T. 46 N.
Dafter
D A F T E R
B R U C E
27
26
25
34
35
36
CENTRAL WISCONSIN
MACKINAC TRAIL
12 MILE ROAD
75
129
585 000 FEET
560 000 FEET
2 650 000 FEET
2 665 000 FEET
water
w
10B
10D
10F
11A
12
114B
114D
130A
133
44B
44D
92A
93F
95A
123B
29A
32A
33
35
36
37
99A
119
150
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 125

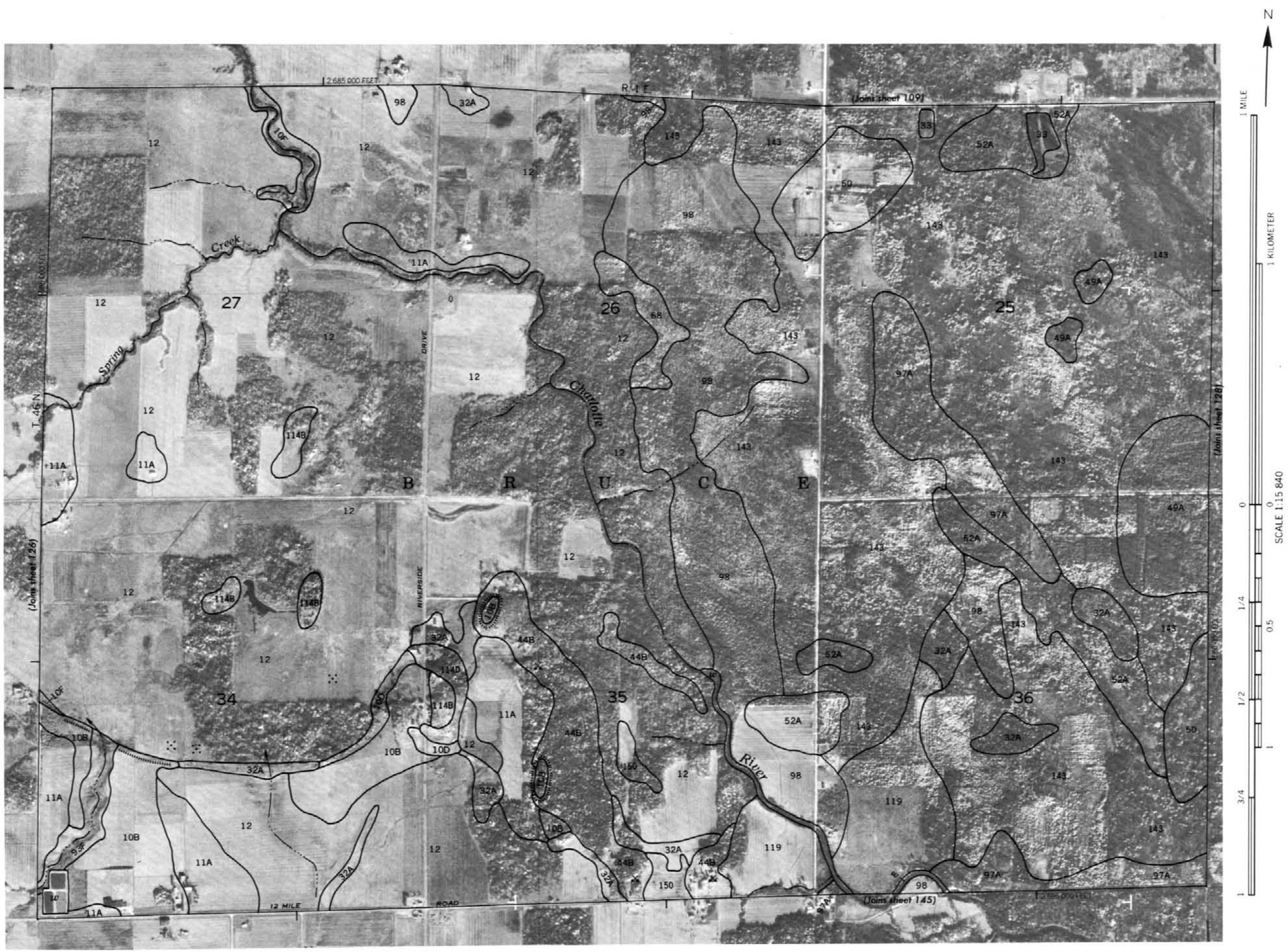

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 108)
(Joins sheet 125)
(Joins sheet 127)
(Joins sheet 144)
R. 1 E.
T. 46 N.
B R U C E
28
29
30
31
32
33
River
Charlotte
South
Branch
Creek
Spring
12 MILE
ROAD
129
114B
11A
10B
10D
10F
12
93F
44B
114B
114D
117B
121B
132B

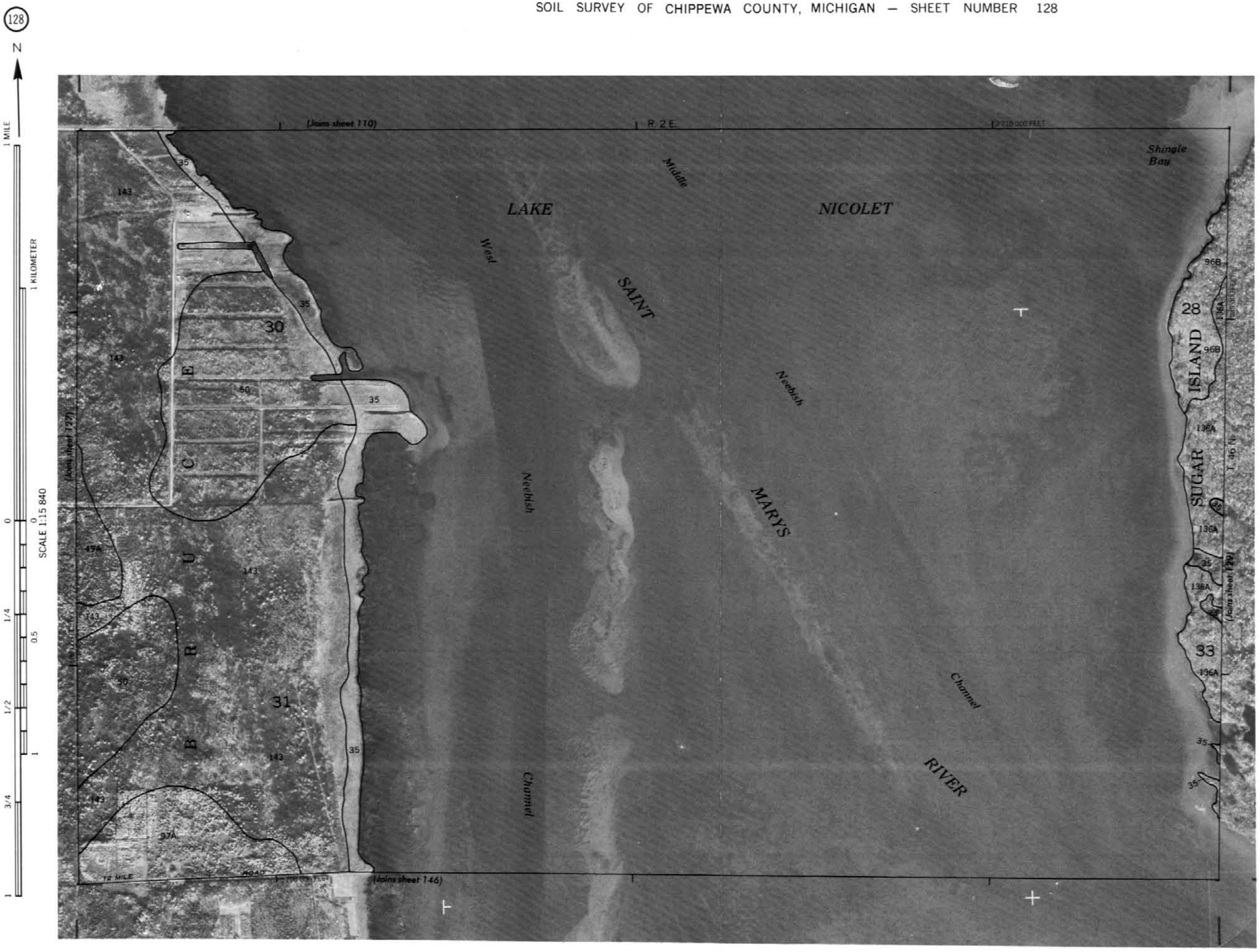
CHIPPEWA COUNTY, MICHIGAN NO. 126

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981- 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from **1981-1983** aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 127


N
2 685 000 FEET
R. 1 E.
T. 46 N.
(Joins sheet 109)
(Joins sheet 128)
(Joins sheet 145)
(Joins sheet 126)
Spring Creek
Charlotte River
B R U C E
RIVERSIDE DRIVE
12 MILE ROAD
27
26
25
34
35
36
12
10F
98
32A
11A
114B
114D
10B
10D
93F
W
143
50
52A
33
49A
97A
68
44B
150
119
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840


128
N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 110)
R. 2 E.
2 210 000 FEET
Shingle Bay
Middle
LAKE
NICOLET
West
SAINT
Neebish
MARYS
Channel
RIVER
Neebish
Channel
SUGAR
ISLAND
T. 46 N.
(Joins sheet 129)
(Joins sheet 127)
(Joins sheet 146)
12 MILE
ROAD
B R U C E
28
30
31
33
35
50
49A
97A
96B
136A
143

CHIPPEWA COUNTY, MICHIGAN NO. 128

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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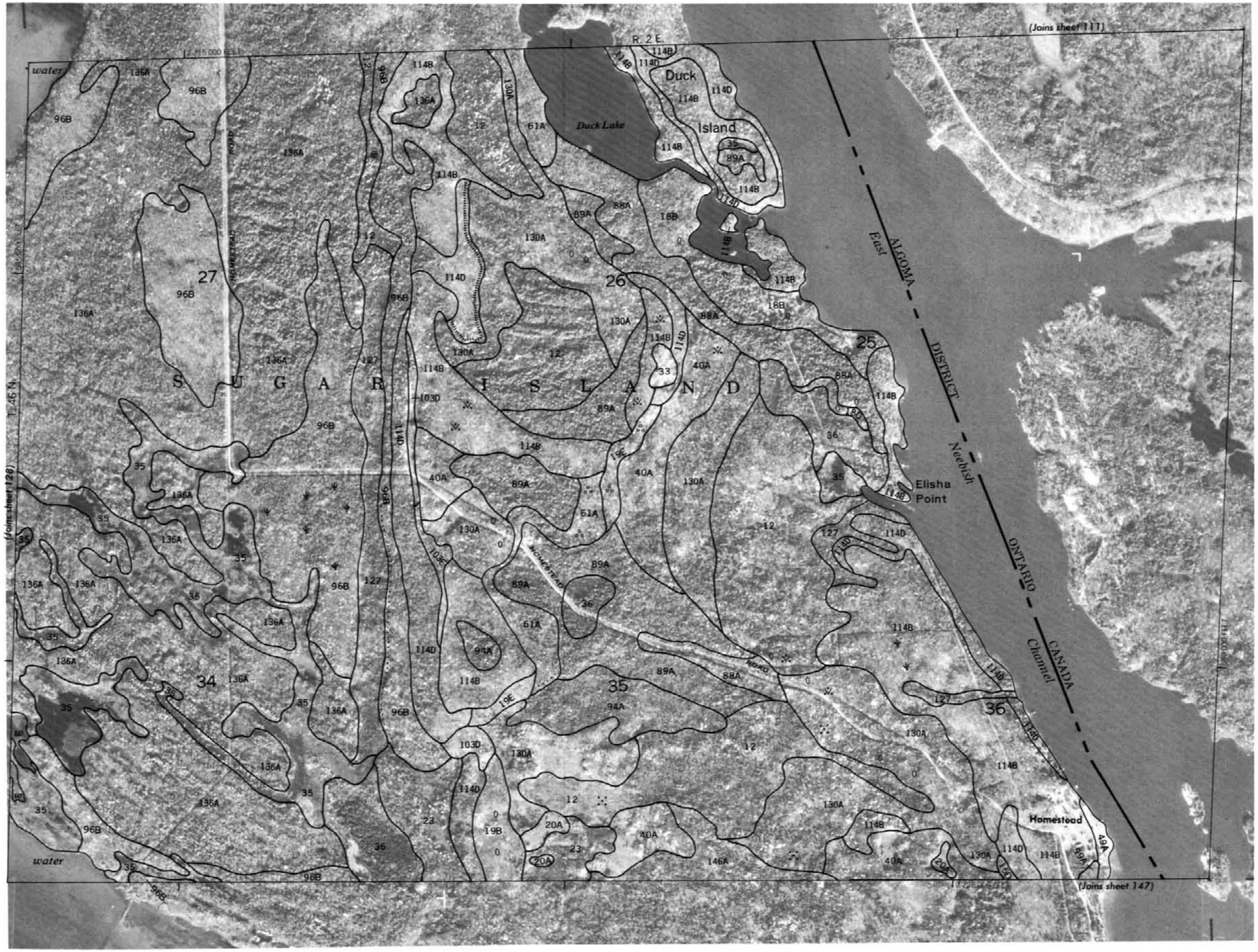
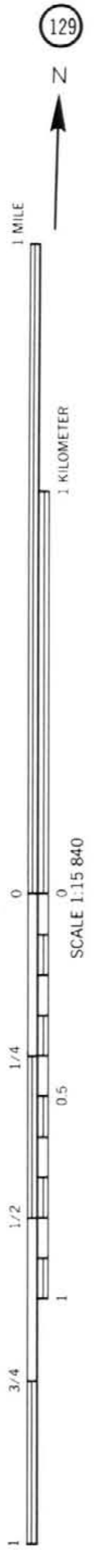
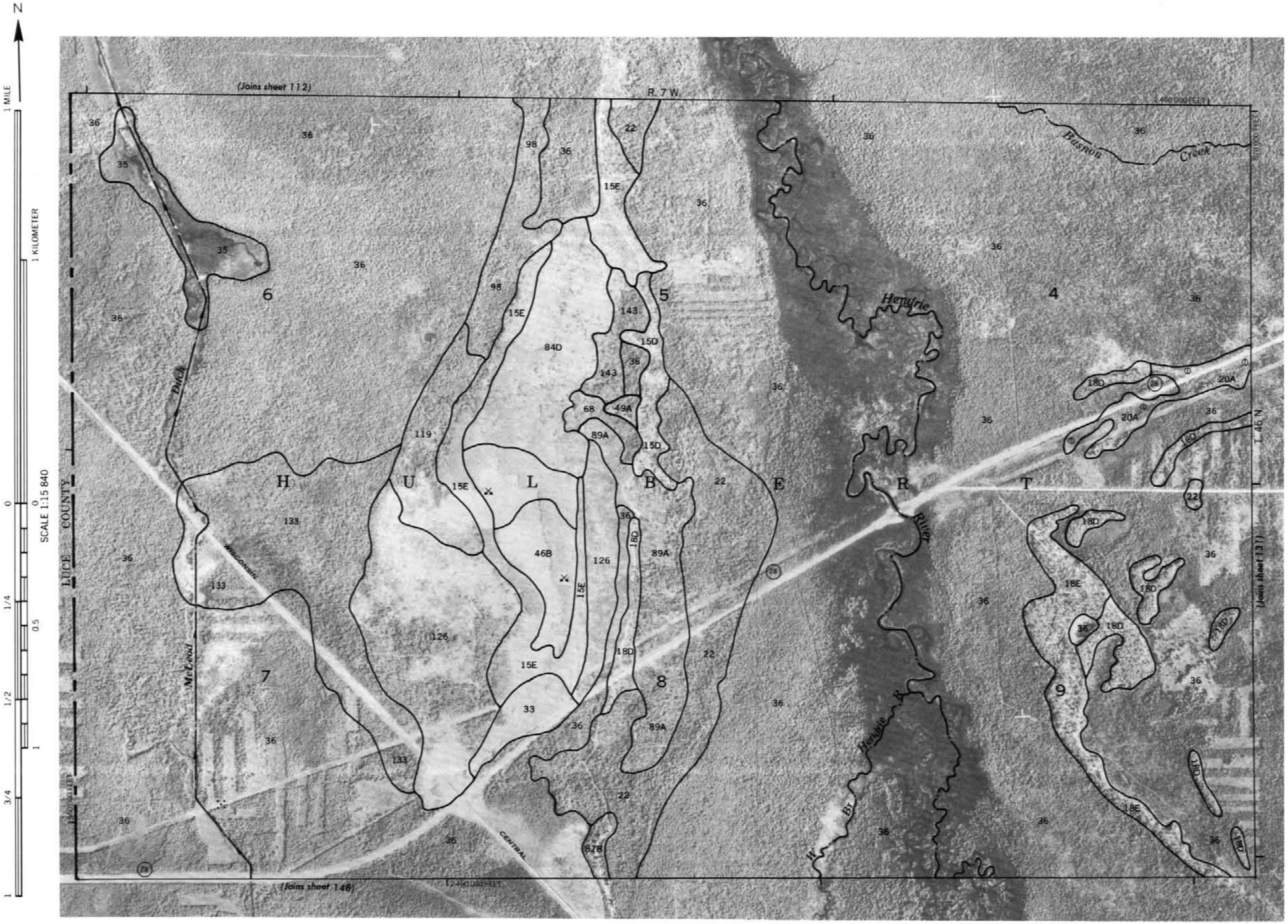
CHIPPEWA COUNTY, MICHIGAN NO. 129


(Joins sheet 111)
(Joins sheet 128)
(Joins sheet 147)
R. 2 E.
T. 46 N.
S U G A R I S L A N D
Duck Island
Duck Lake
Elisha Point
Homestead
East Neebish Channel
ALGOMA DISTRICT
ONTARIO CANADA
water
HOMESTEAD ROAD
27
26
25
34
35
36
96B
136A
12
114B
114D
130A
61A
89A
88A
18B
35
40A
33
127
103D
19E
36
94A
23
19B
20A
146A
49A
2 015 000 FEET


N
1 MILE
1 KILOMETER
0
0
1/4
0.5
1/2
3/4
1
1
SCALE 1:15 840

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 130


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 112)
(Joins sheet 148)
(Joins sheet 131)
R. 7 W.
T. 46 N.
LUCE COUNTY
H U L B E R T
Hendrie
River
W. Br. Hendrie R.
Bushnog Creek
Ditch
McLeod
WISCONSIN
CENTRAL
28
2 460 000 FEET
670 000 FEET
4
5
6
7
8
9
36
35
98
22
15E
15D
143
84D
119
68
49A
89A
126
46B
133
33
18D
18E
20A
87B

CHIPPEWA COUNTY, MICHIGAN NO. 130

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981- 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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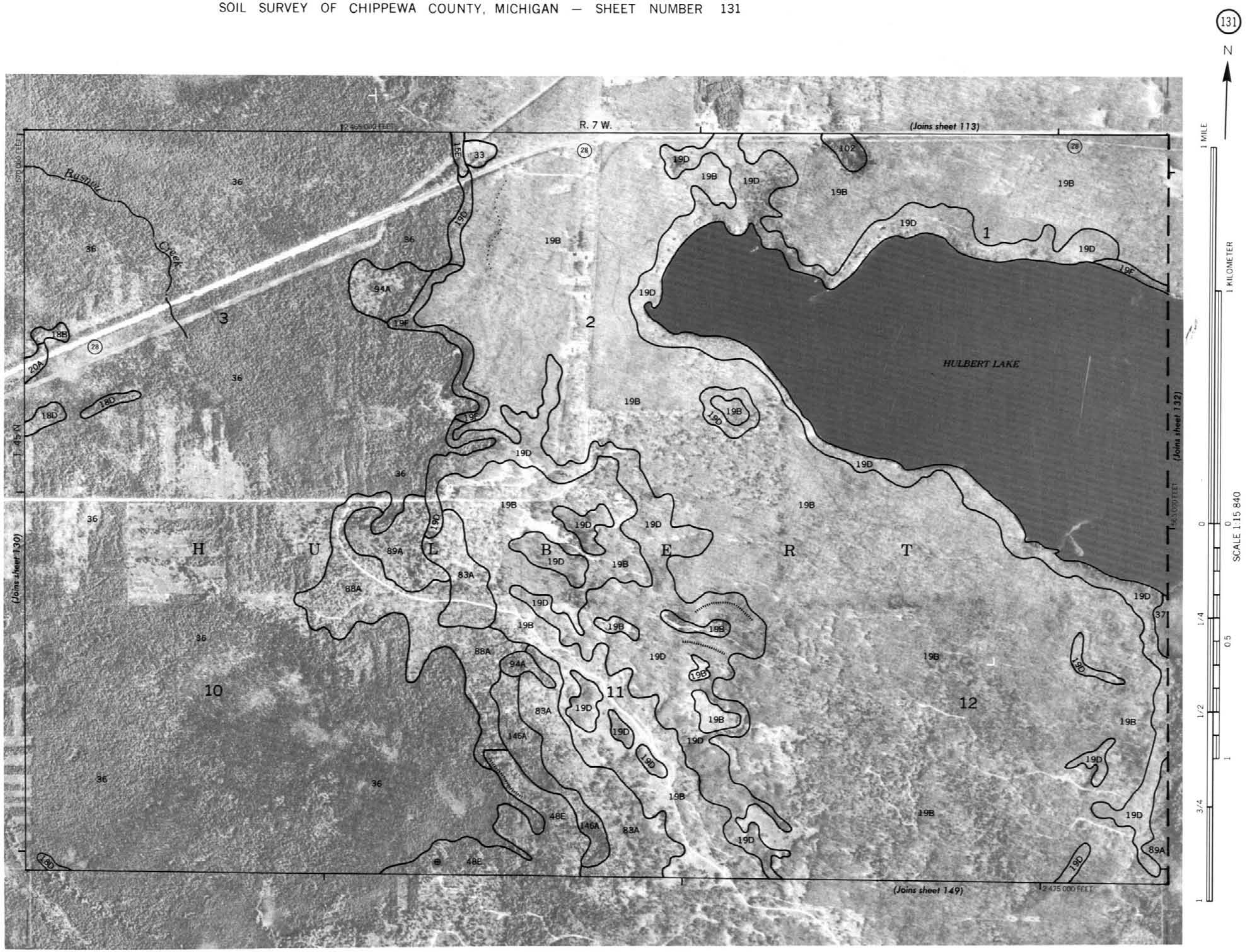
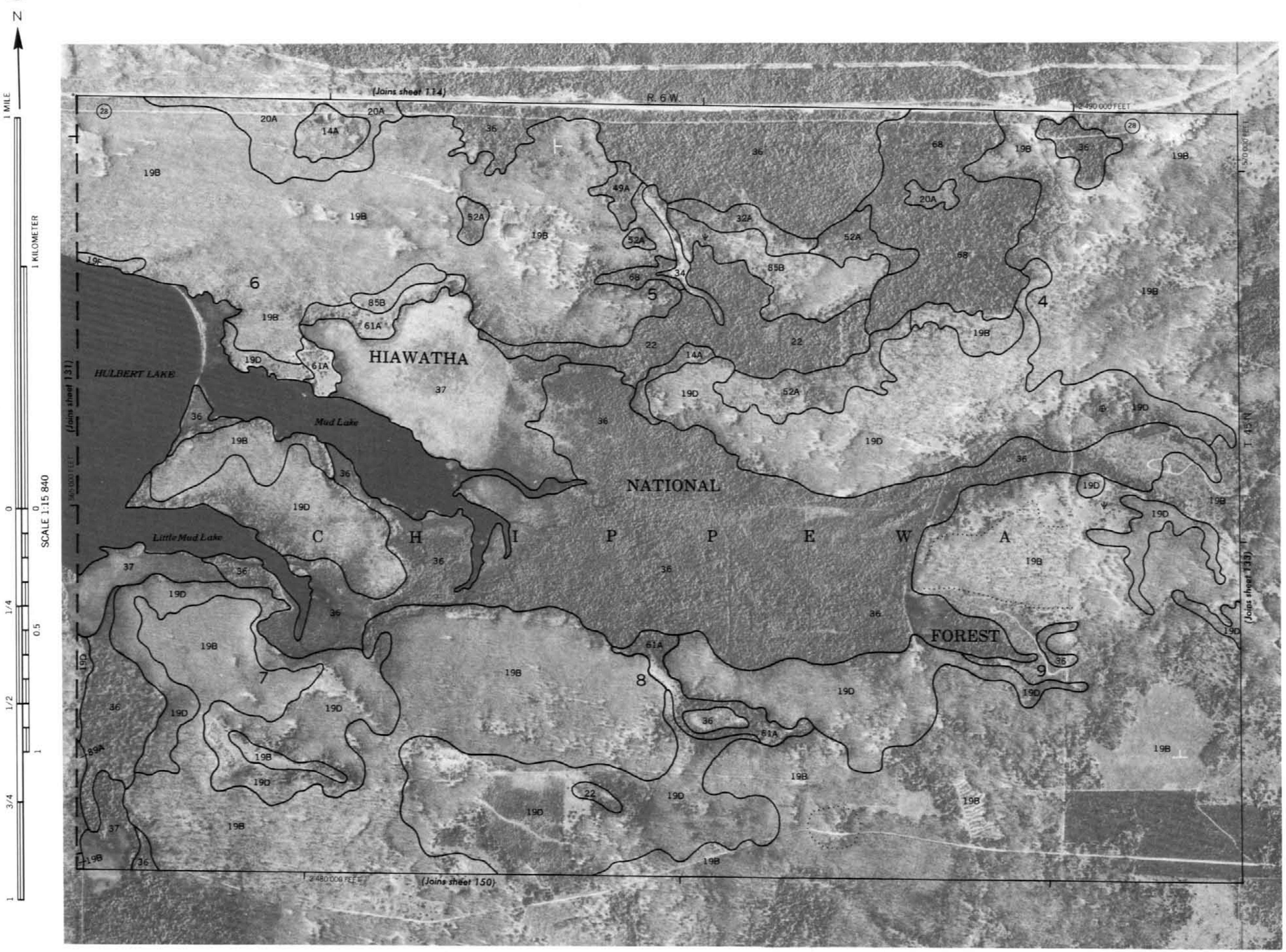
CHIPPEWA COUNTY, MICHIGAN NO. 131


131
N
R. 7 W.
(Joins sheet 113)
(Joins sheet 132)
(Joins sheet 149)
(Joins sheet 130)
T. 45 N.
2 465 000 FEET
2 475 000 FEET
570 000 FEET
560 000 FEET
28
HULBERT LAKE
H U L B E R T
Busnou Creek
1
2
3
10
11
12
36
33
102
19B
19D
19F
18B
18D
20A
94A
89A
88A
83A
146A
48E
37
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 132

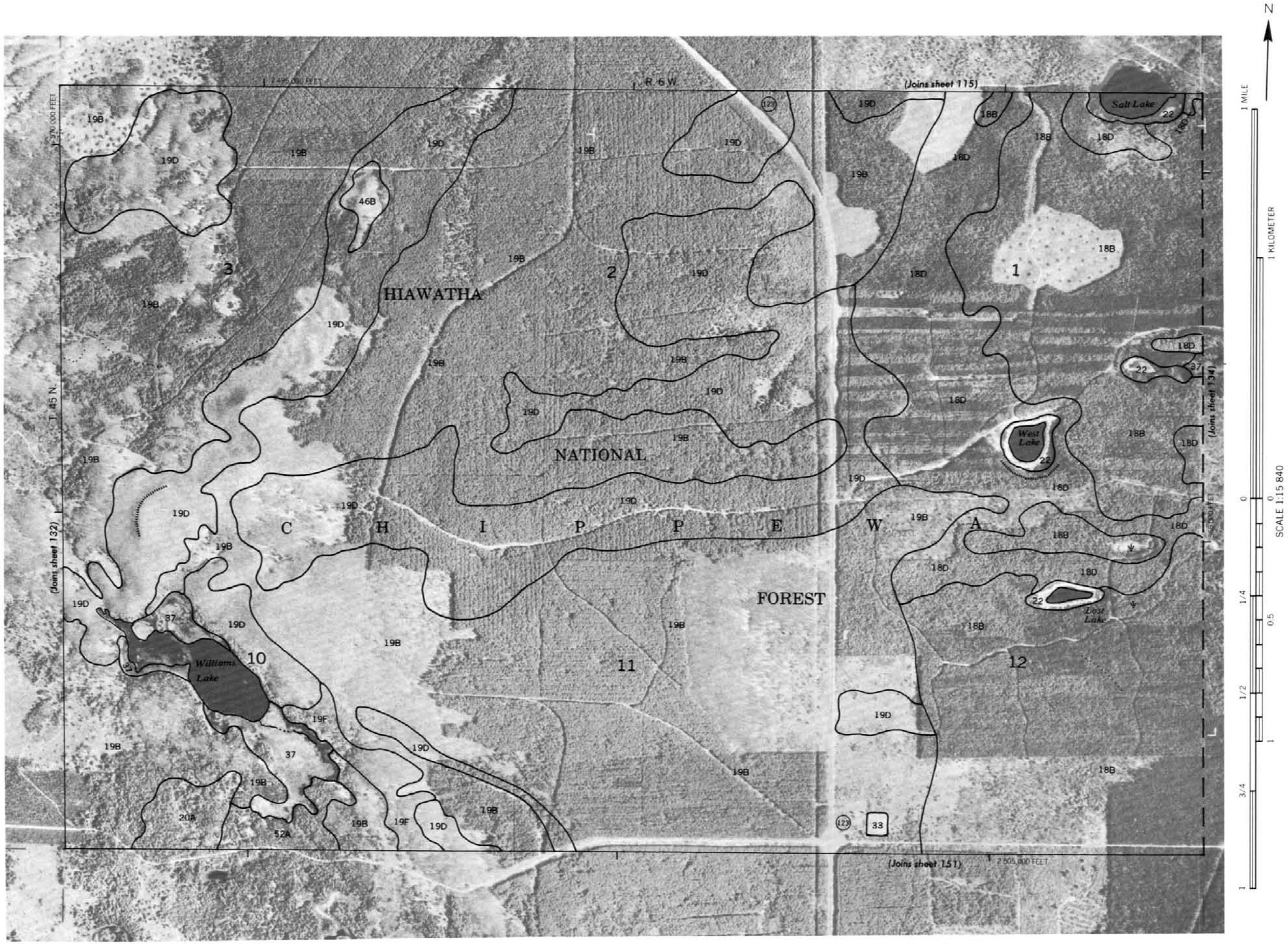

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
(Joins sheet 114)
R. 6 W.
2 490 000 FEET
520 000 FEET
T. 45 N.
(Joins sheet 131)
(Joins sheet 133)
(Joins sheet 150)
2 480 000 FEET
500 000 FEET
28
HULBERT LAKE
Mud Lake
Little Mud Lake
HIAWATHA
NATIONAL
C H I P P E W A
FOREST
4
5
6
7
8
9
19B
19D
19E
20A
14A
36
37
49A
52A
61A
68
22
32A
34
85B
89A

CHIPPEWA COUNTY, MICHIGAN NO. 132

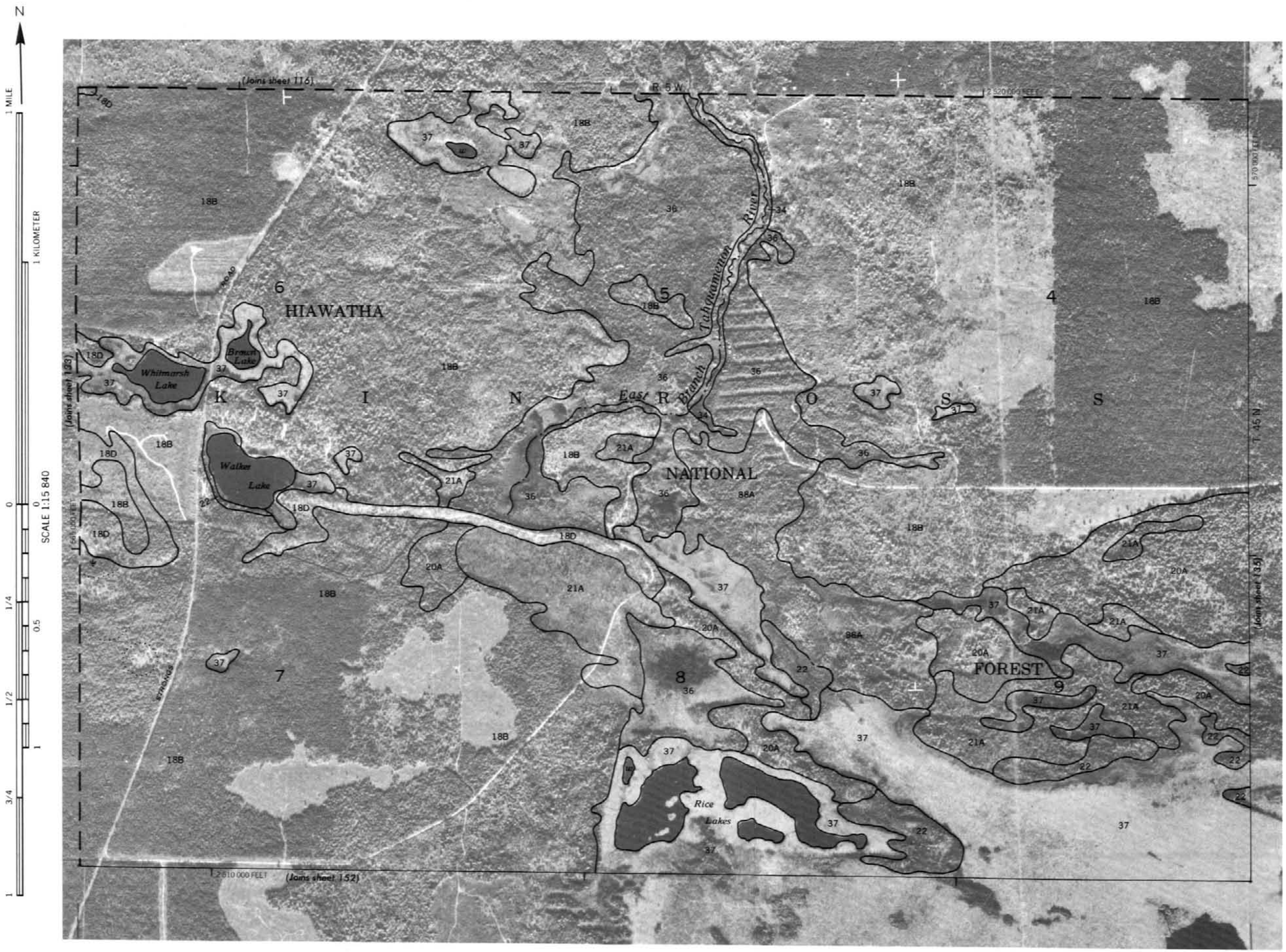
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 133


N
(Joins sheet 115)
(Joins sheet 132)
(Joins sheet 134)
(Joins sheet 151)
R. 6 W.
T. 45 N.
2 495 000 FEET
2 505 000 FEET
370 000 FEET
HIAWATHA
NATIONAL
FOREST
C H I P P E W A
Salt Lake
West Lake
Lost Lake
Williams Lake
1
2
3
10
11
12
123
33
19B
19D
19F
18B
18D
22
37
46B
20A
52A
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 134

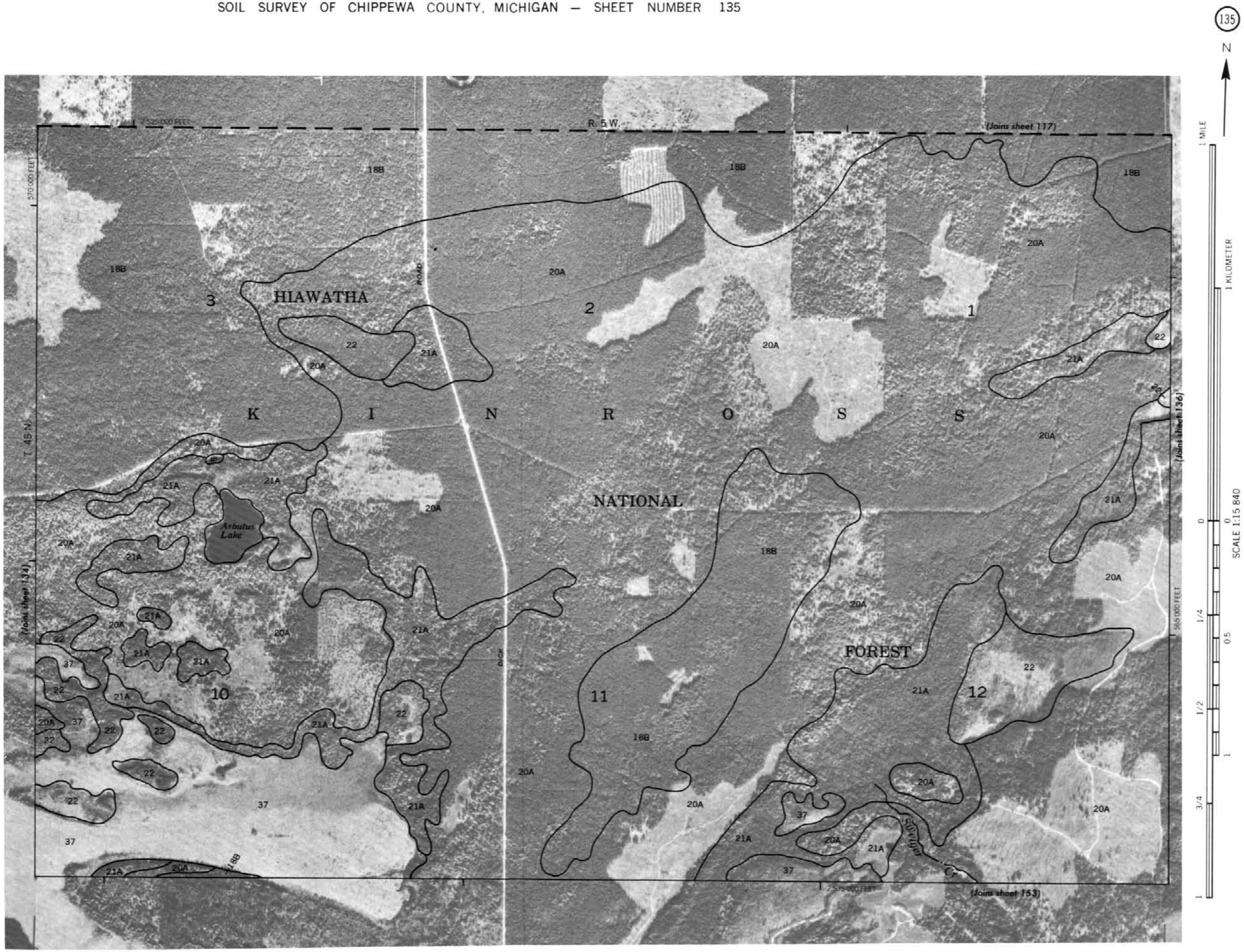

N
1 MILE
1 KILOMETER
0
SCALE 1:15 840
1/4
0.5
1/2
3/4
1
(Joins sheet 116)
R 5 W
2 520 000 FEET
570 000 FEET
T 45 N
(Joins sheet 133)
(Joins sheet 135)
2 510 000 FEET
(Joins sheet 152)
HIAWATHA
NATIONAL
FOREST
K I N R O S S
Whitmarsh Lake
Branch Lake
Walker Lake
Rice Lakes
East Branch Tahquamenon River
ROAD
4
5
6
7
8
9
18B
18D
20A
21A
22
34
36
37
88A
w

CHIPPEWA COUNTY, MICHIGAN NO. 134

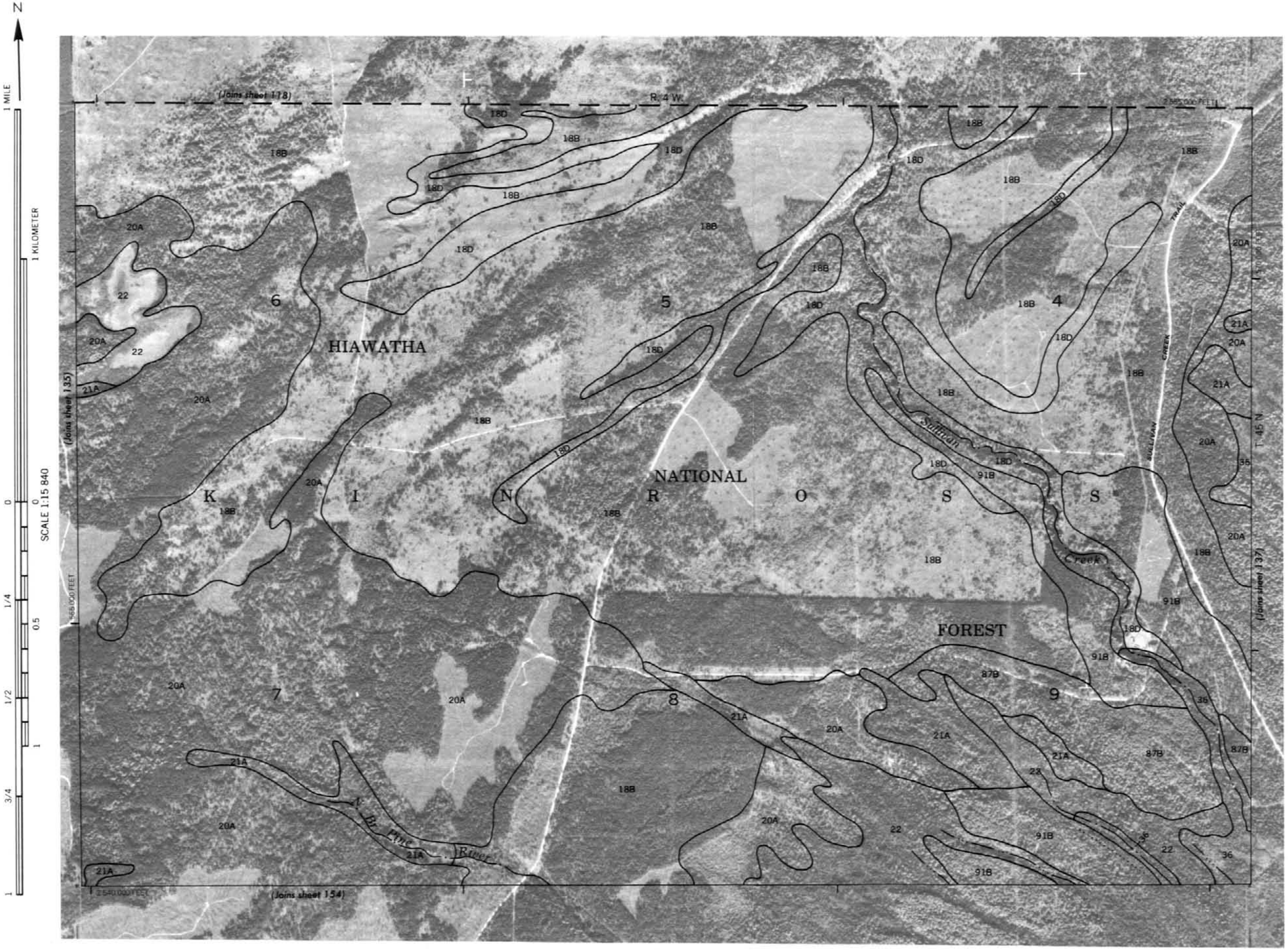
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 135

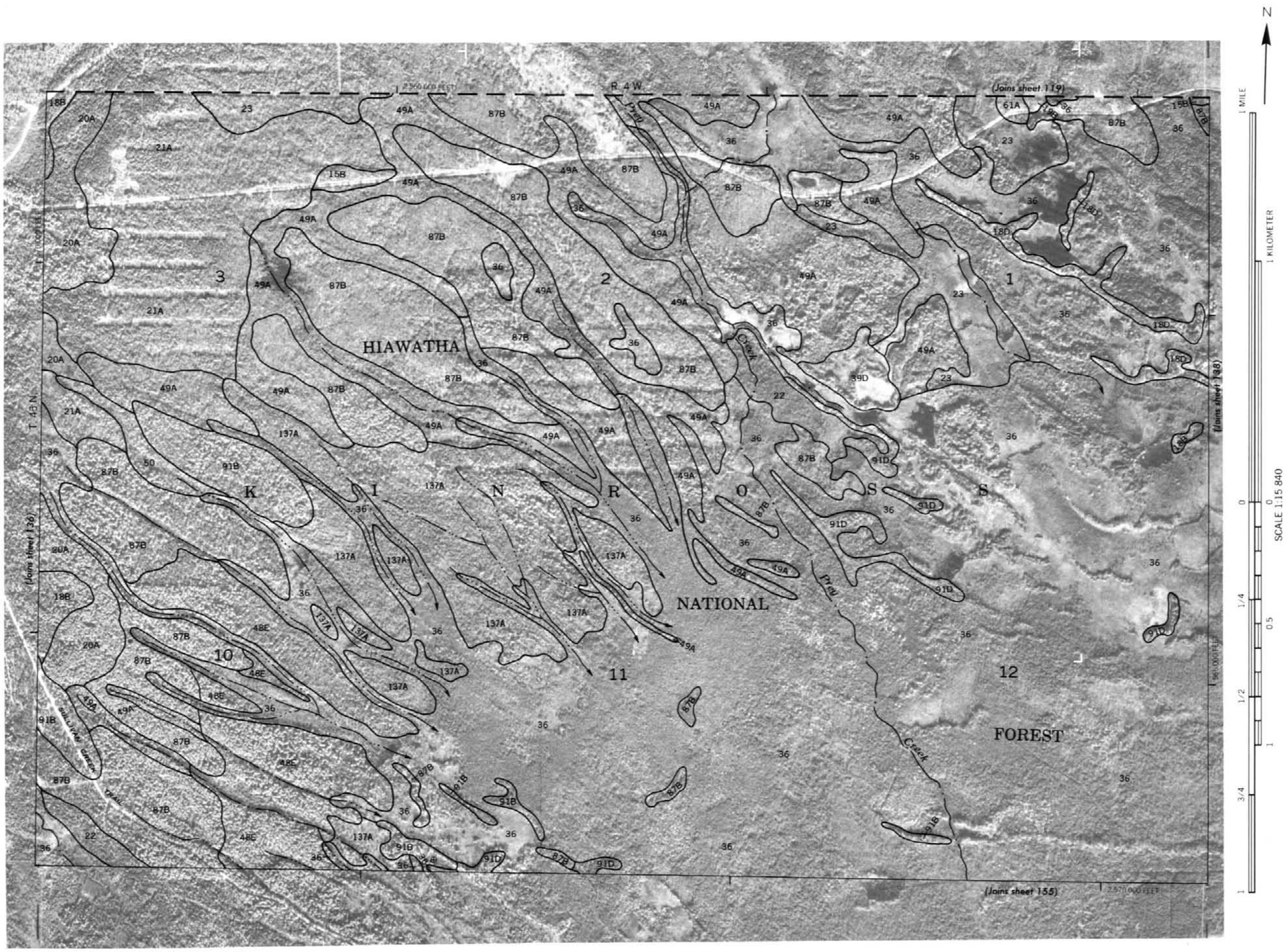

135
N
R. 5 W.
(Joins sheet 117)
(Joins sheet 136)
(Joins sheet 134)
(Joins sheet 153)
2 525 000 FEET
2 535 000 FEET
570 000 FEET
565 000 FEET
T. 45 N.
HIAWATHA
NATIONAL
FOREST
KINROSS
ROAD
DICK
Arbutus Lake
Sawyer Cr.
1
2
3
10
11
12
18B
20A
21A
22
37
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 136


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 118)
R. 4 W.
(Joins sheet 135)
(Joins sheet 137)
(Joins sheet 154)
T. 45 N.
HIAWATHA
NATIONAL
FOREST
K I N R O S S
4
5
6
7
8
9
Sullivan Creek
Sullivan Creek Trail
N. Br. Pine River
18B
18D
20A
21A
22
23
36
87B
91B
2 540 000 FEET
565 000 FEET

CHIPPEWA COUNTY, MICHIGAN NO. 136

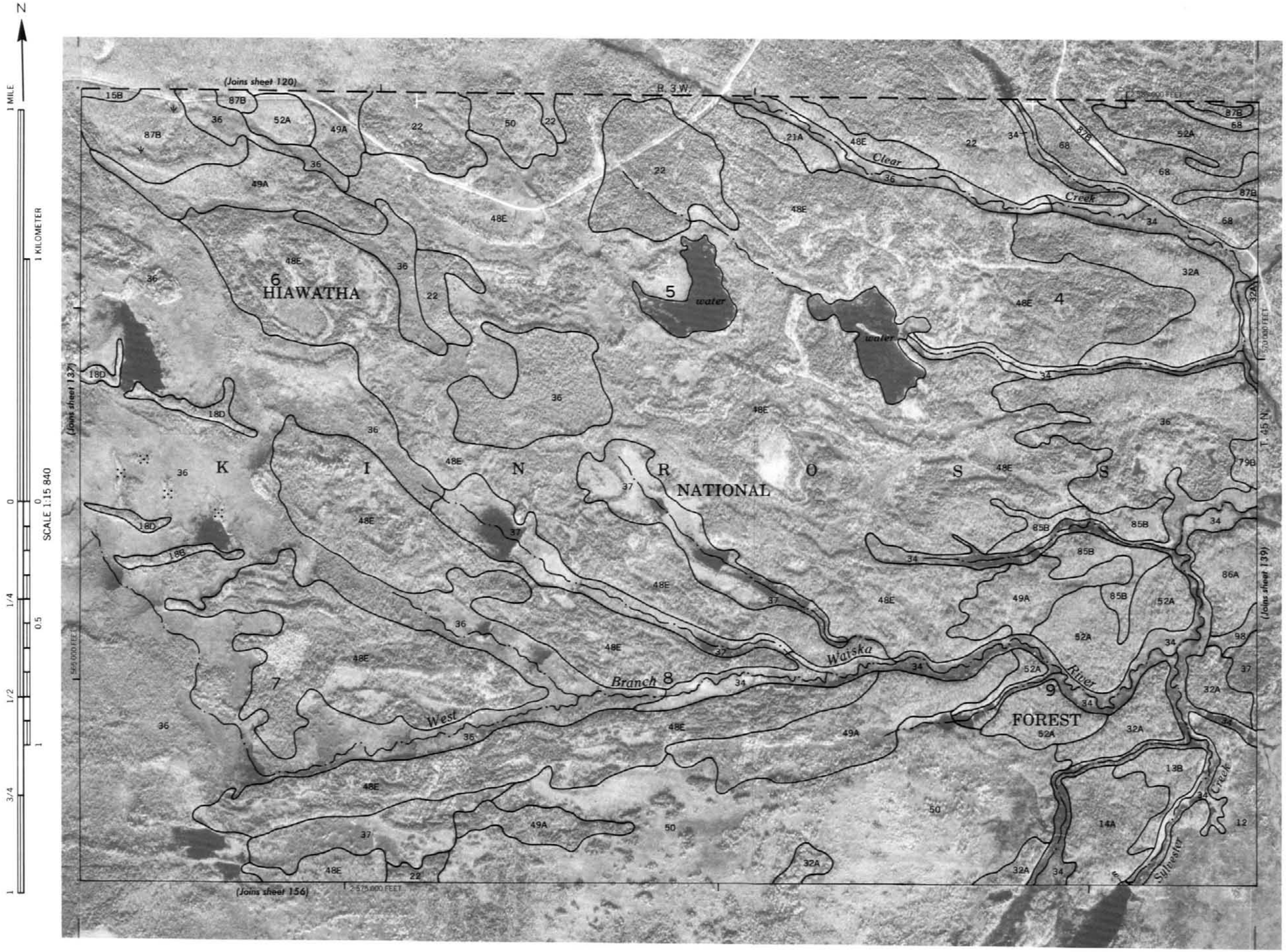
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
(Joins sheet 119)
R 4 W
T 45 N
(Joins sheet 136)
(Joins sheet 138)
(Joins sheet 155)
HIAWATHA
NATIONAL
FOREST
K I N R O S S
Creek
1
2
3
10
11
12
18B
20A
21A
23
15B
49A
87B
36
61A
18D
39D
22
137A
50
91B
91D
48E
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

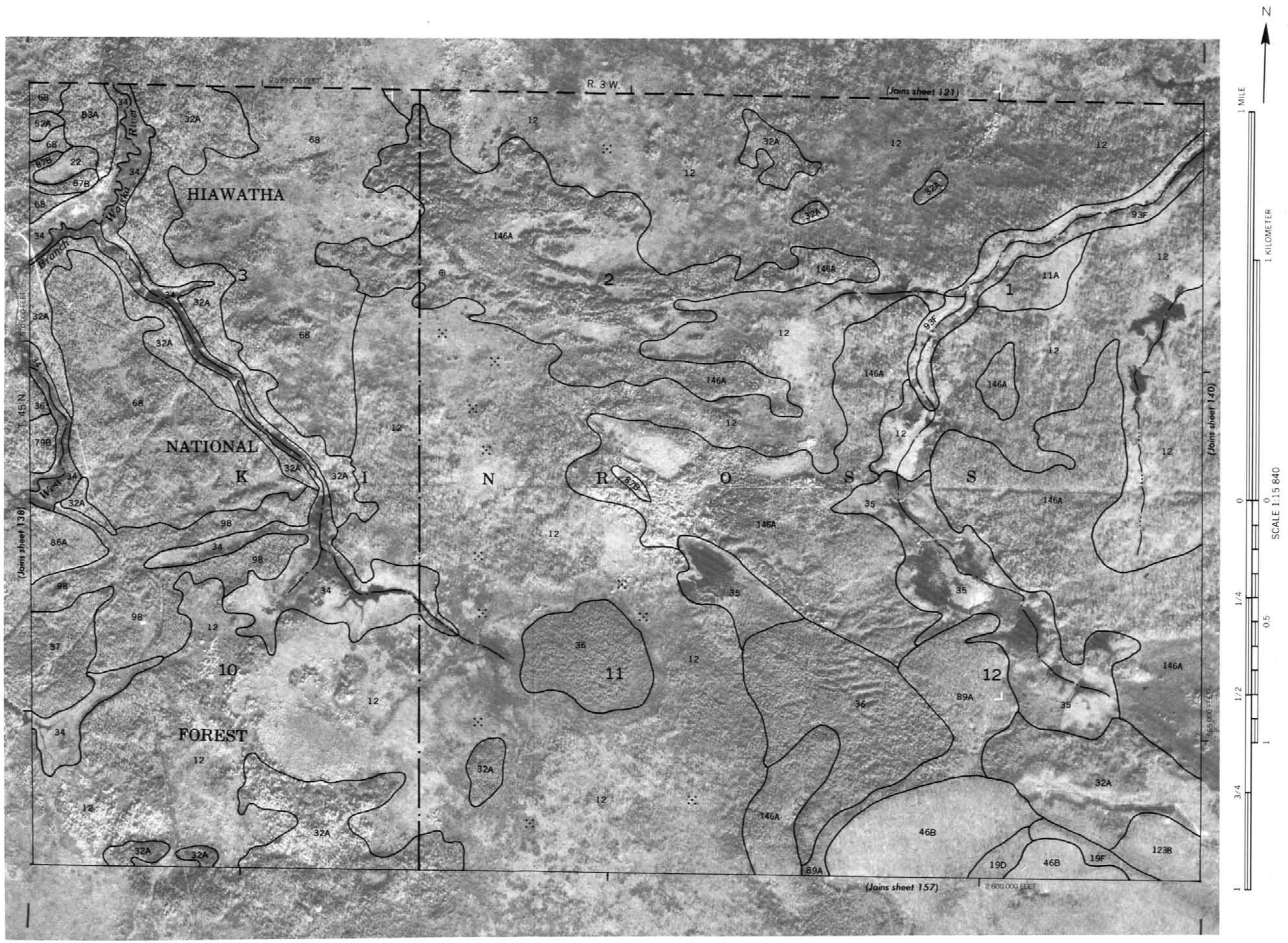
CHIPPEWA COUNTY, MICHIGAN NO. 137

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 138


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 120)
(Joins sheet 137)
(Joins sheet 139)
(Joins sheet 156)
R. 3 W.
T. 45 N.
2 575 000 FEET
590 000 FEET
560 000 FEET
HIAWATHA
NATIONAL
FOREST
K I N R O S S
Clear Creek
Waiska River
West Branch
Sylvester Creek
water
water
4
5
6
7
8
9
15B
87B
36
52A
49A
22
50
48E
21A
34
68
32A
18D
18B
37
35
85B
86A
79B
98
13B
14A
12

CHIPPEWA COUNTY, MICHIGAN NO. 138

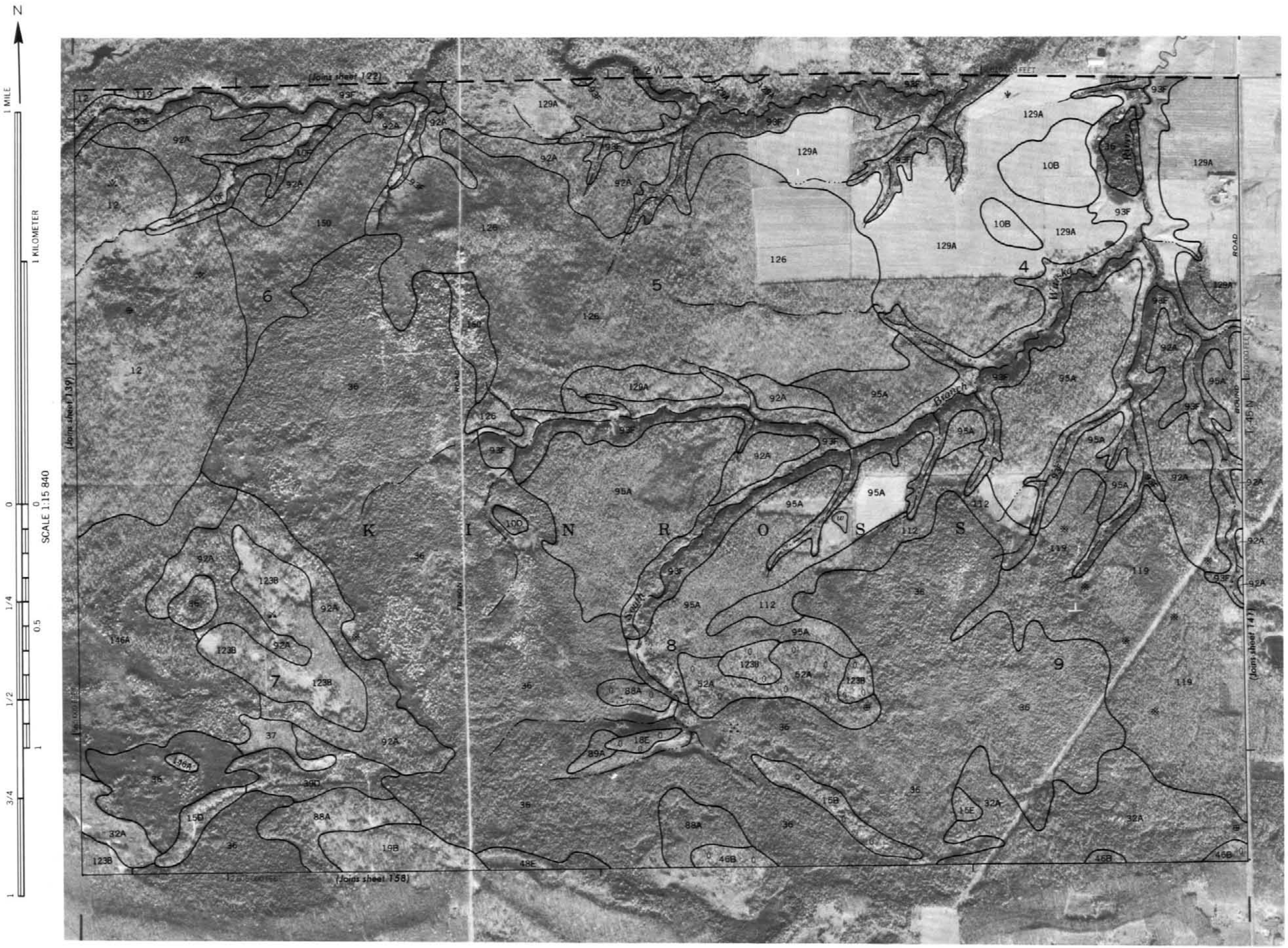
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
SCALE 1:15 840
R. 3 W.
T. 45 N.
(Joins sheet 121)
(Joins sheet 140)
(Joins sheet 157)
(Joins sheet 138)
2 590 000 FEET
2 600 000 FEET
HIAWATHA
NATIONAL
FOREST
K I N R O S S
West Branch Waiska River
2
3
10
11
12
1
68
83A
34
52A
87B
22
32A
36
79B
86A
98
37
12
146A
93F
11A
35
89A
46B
19D
19F
123B
89A

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 139

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 140

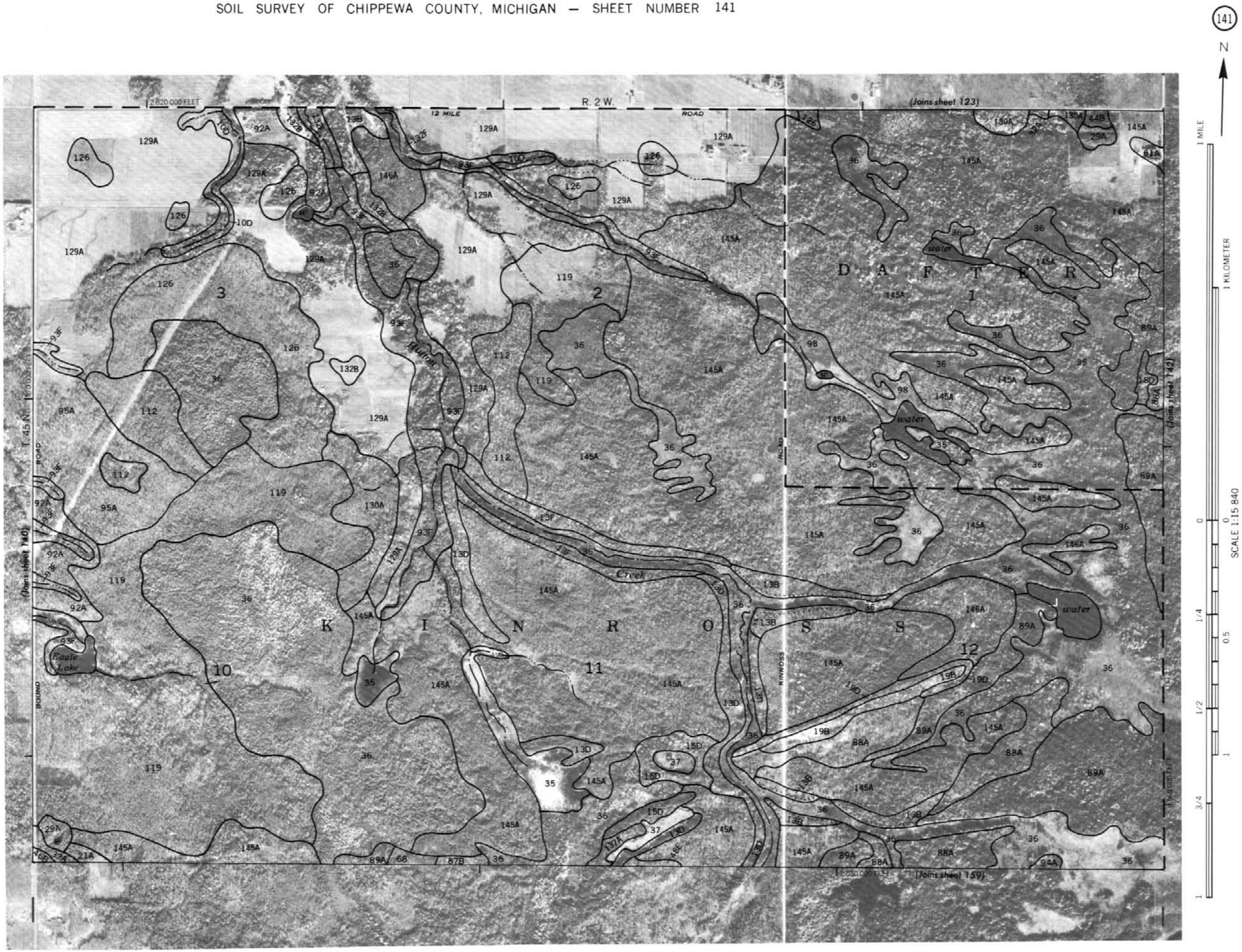

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
(Joins sheet 122)
(Joins sheet 139)
(Joins sheet 141)
(Joins sheet 158)
R. 2 W.
T. 45 N.
ROAD
K I N R O S S
South Branch
Waiska River
4
5
6
7
8
9
12
119
93F
92A
10F
150
126
129A
10B
36
95A
100
112
123B
146A
37
39D
15D
32A
88A
19B
48E
46B
89A
18E
52A
123B
15B
16E

CHIPPEWA COUNTY, MICHIGAN NO. 140

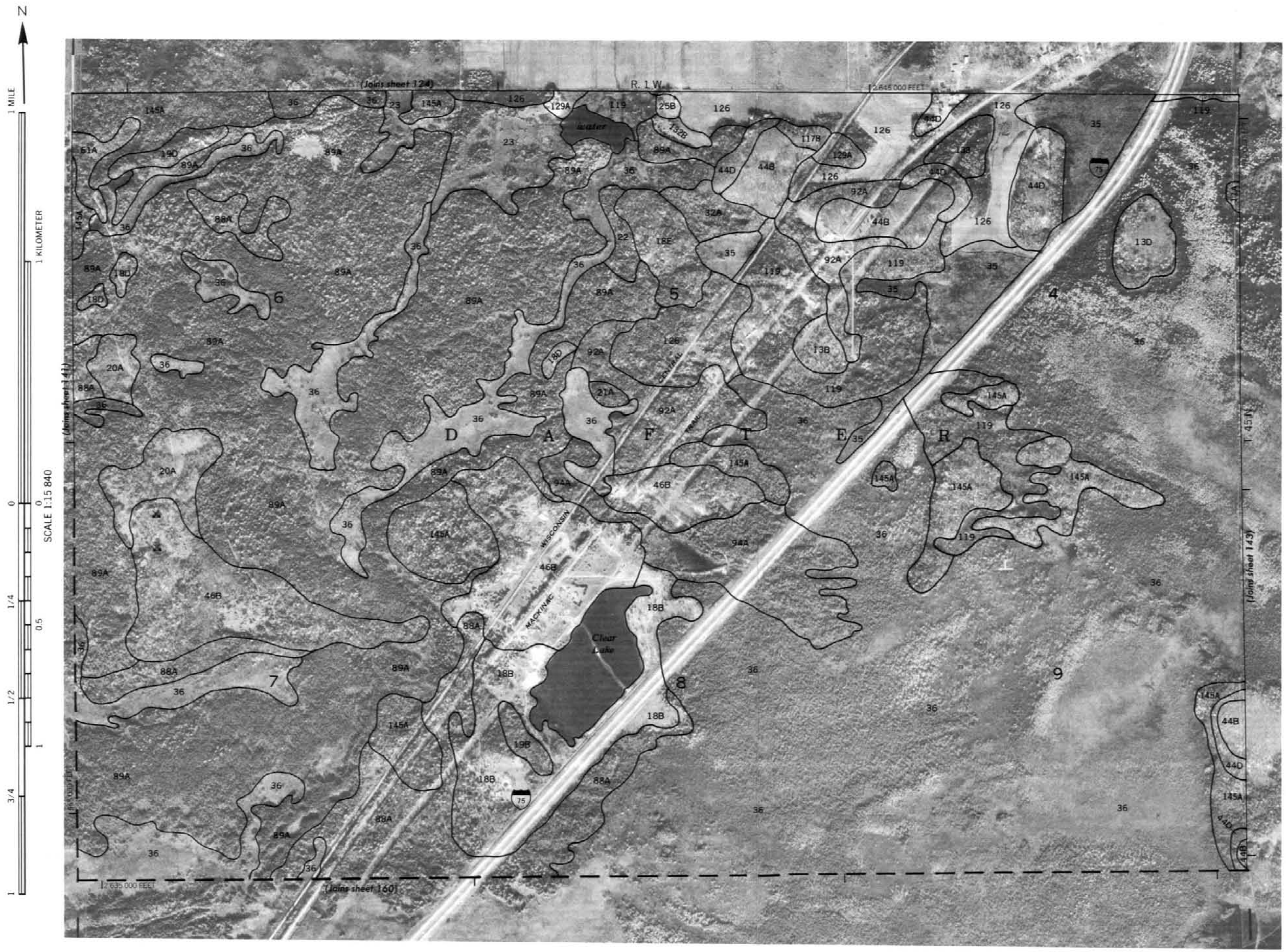
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 141


141
N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
2 820 000 FEET
R. 2 W.
12 MILE ROAD
(Joins sheet 123)
(Joins sheet 142)
(Joins sheet 159)
(Joins sheet 140)
T. 45 N.
ROAD
BOUND ROAD
KINROSS ROAD
ROAD
D A F T E R
K I N R O S S
1
2
3
10
11
12
Huron
Creek
Eagle Lake
water
129A
126
10D
92A
132B
13B
146A
93F
36
119
112
95A
130A
129A
13D
13F
145A
35
37
15D
13B
98
89A
88A
19B
19D
44B
29A
91A
130M
94A
87B
68
21A
33A
137A
48E

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 142


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 124)
R. 1 W.
2 645 000 FEET
(Joins sheet 141)
(Joins sheet 143)
(Joins sheet 160)
2 635 000 FEET
T. 45 N.
water
Clear Lake
D A F T E R
WISCONSIN
MACKINAC
CENTRAL
TRAIL
75
4
5
6
7
8
9
145A
36
23
126
129A
119
25B
132B
89A
51A
19D
88A
18D
20A
21A
22
18E
32A
35
44D
44B
117B
92A
13B
13D
46B
94A
18B
19B
88A
145A

CHIPPEWA COUNTY, MICHIGAN NO. 142

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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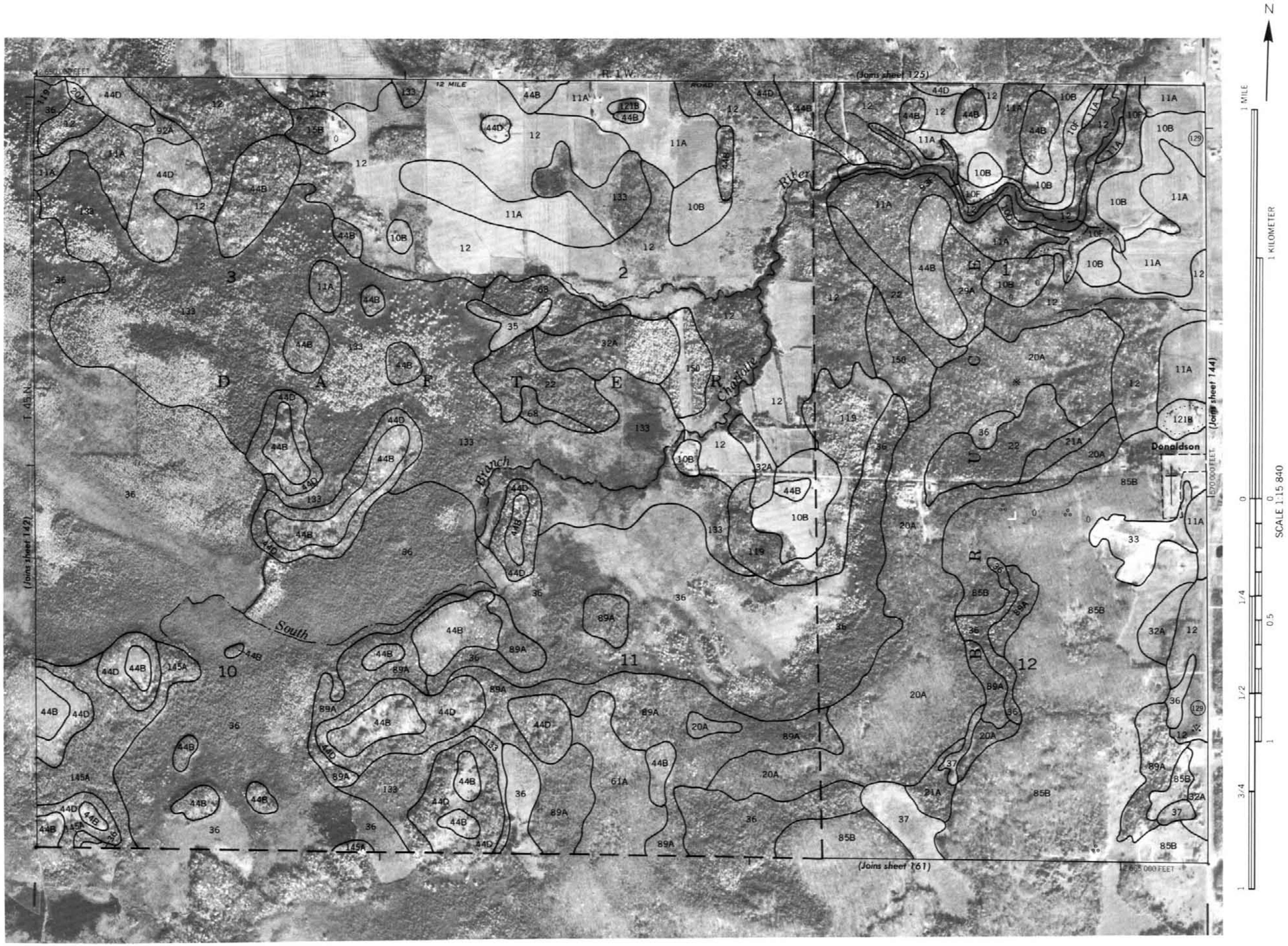
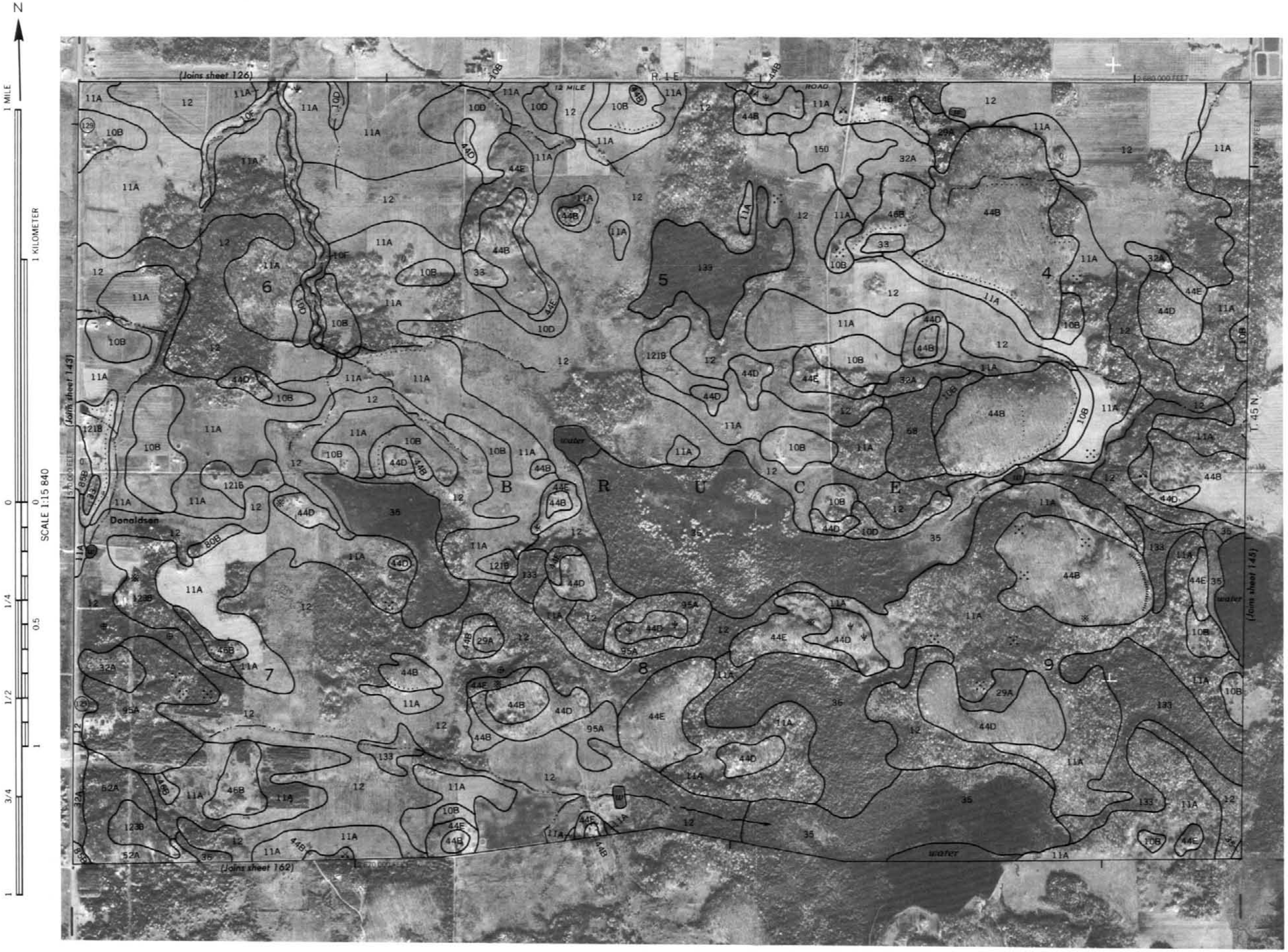
CHIPPEWA COUNTY, MICHIGAN NO. 143


(Joins sheet 125)
(Joins sheet 144)
(Joins sheet 161)
(Joins sheet 142)
R. 1 W.
T. 45 N.
12 MILE ROAD
D A F T E R
Charlotte River
South Branch
Donaldson
1
2
3
10
11
12
N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

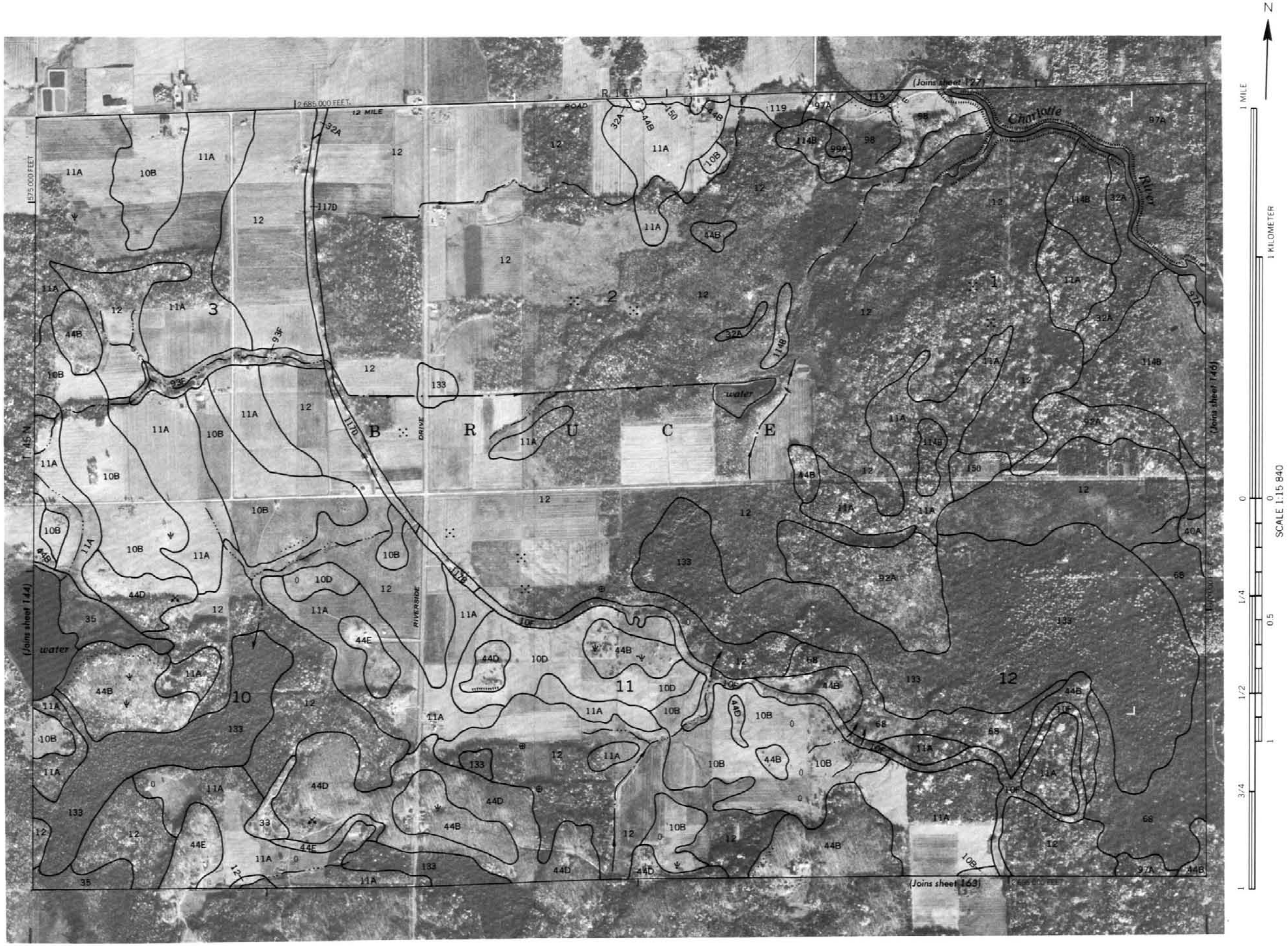
(144)

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 144


N
1 MILE
1 KILOMETER
0
0
SCALE 1:15 840
1/4
0.5
1/2
1
3/4
1
(Joins sheet 126)
(Joins sheet 143)
(Joins sheet 145)
(Joins sheet 162)
R. 1 E.
T. 45 N.
12 MILE ROAD
Donaldson
B R U C E
water
4
5
6
7
8
9
2 680 000 FEET
570 000 FEET

CHIPPEWA COUNTY, MICHIGAN NO. 144

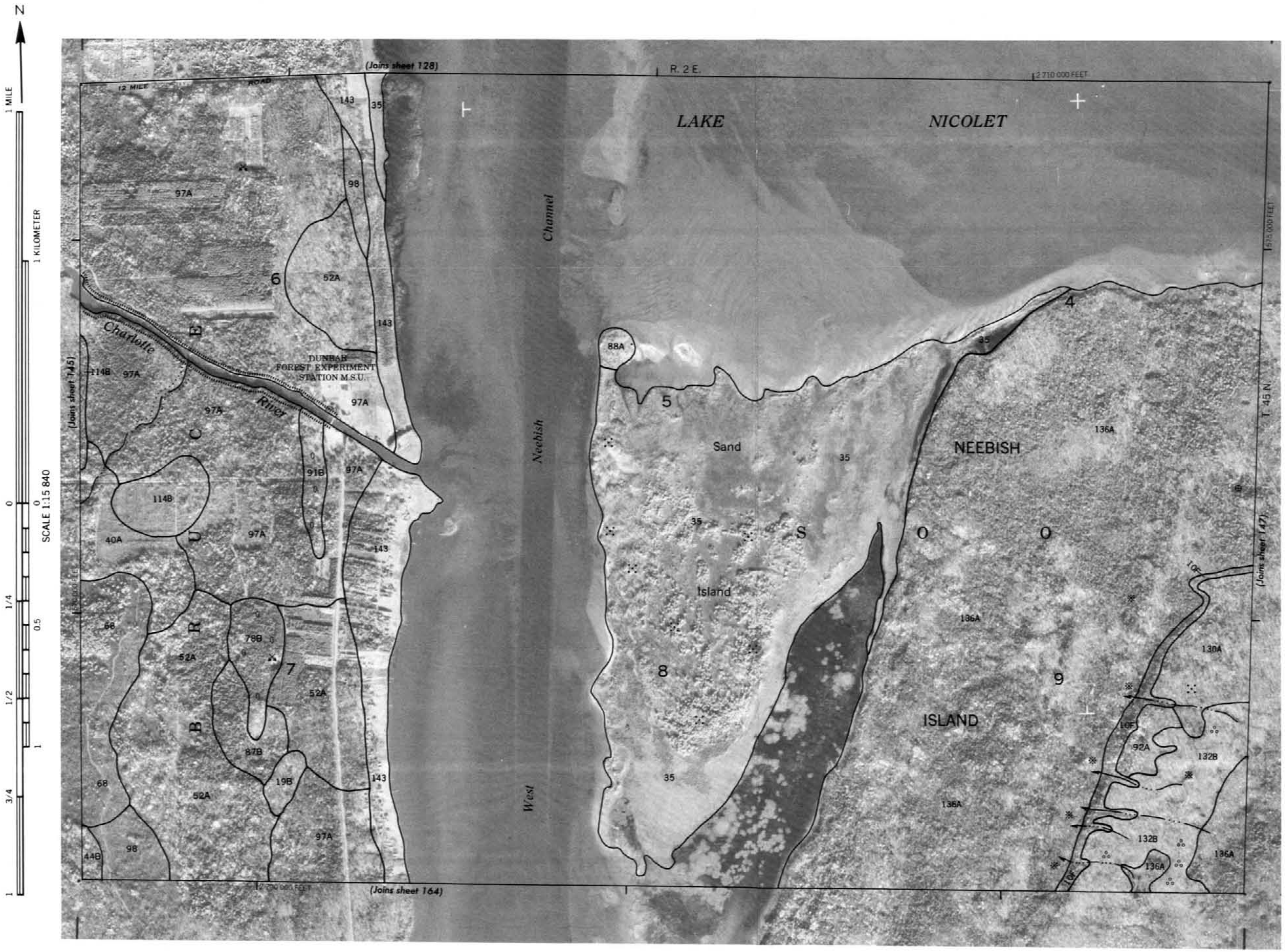
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
12 MILE ROAD
RIVERSIDE DRIVE
Charlotte River
B R U C E
(Joins sheet 127)
(Joins sheet 144)
(Joins sheet 146)
(Joins sheet 163)
2 688 000 FEET
575 000 FEET
T 45 N
R 1 E
1
2
3
10
11
12
water
10B
10D
10F
11A
12
32A
33
35
40A
44B
44D
44E
68
92A
93F
97A
98
99A
114B
117B
117D
119
133
150

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

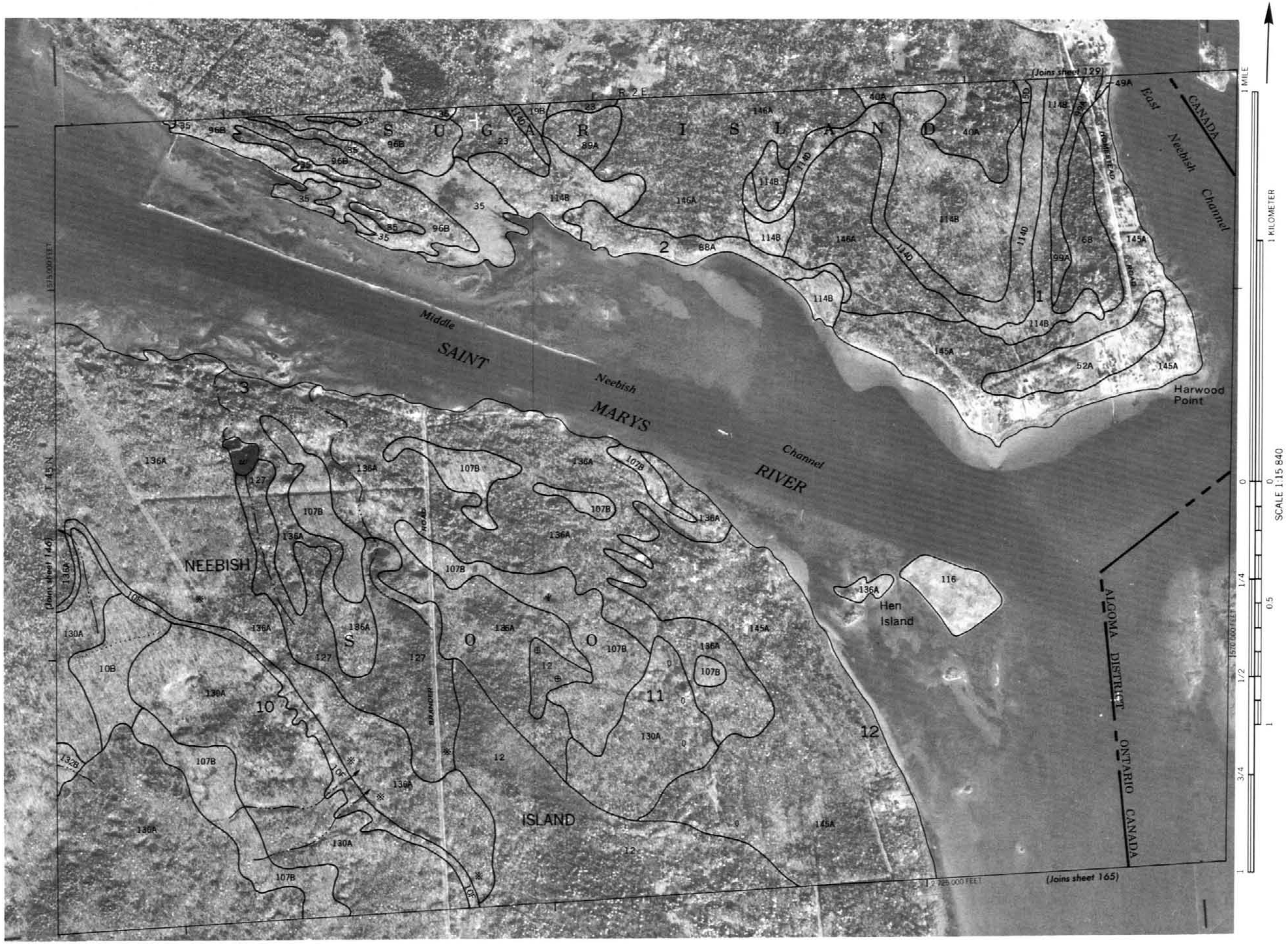
CHIPPEWA COUNTY, MICHIGAN NO. 145

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 146


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
(Joins sheet 128)
(Joins sheet 164)
(Joins sheet 145)
(Joins sheet 147)
R. 2 E.
T. 45 N.
2 710 000 FEET
2 700 000 FEET
12 MILE ROAD
LAKE NICOLET
West Neebish Channel
Charlotte River
DUNBAR FOREST EXPERIMENT STATION M.S.U.
Sand Island
NEEBISH ISLAND
S O O
B R U C E
4
5
6
7
8
9
143
35
98
97A
52A
88A
114B
40A
91B
66
68
78B
87B
19B
44B
136A
130A
132B
92A
10F

CHIPPEWA COUNTY, MICHIGAN NO. 146

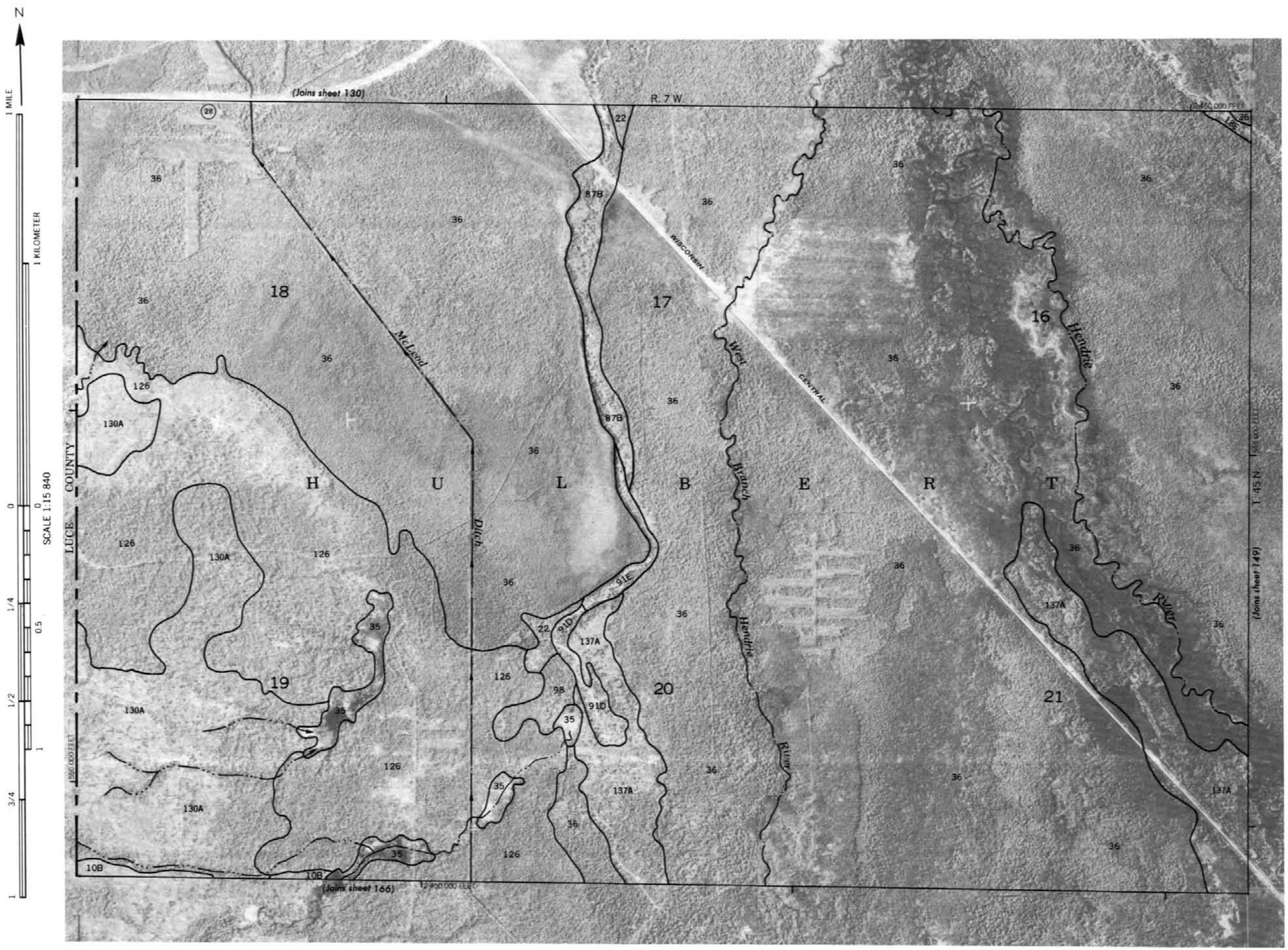
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


147
N
(Joins sheet 129)
(Joins sheet 146)
(Joins sheet 165)
SUGAR ISLAND
NEEBISH
S O O
ISLAND
Middle
SAINT
Neebish
MARYS
Channel
RIVER
East
Neebish
Channel
CANADA
ALGOMA DISTRICT
ONTARIO CANADA
Hen
Island
Harwood
Point
R 2 E
T 45 N
575 000 FEET
2 725 000 FEET
1
2
3
10
11
12
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
0.5

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 147

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 148


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 130)
R. 7 W.
28
22
36
87B
18
17
16
McLeod
Ditch
WISCONSIN
CENTRAL
West
Branch
Hendrie
River
126
130A
H
U
L
B
E
R
T
LUCE COUNTY
T. 45 N.
91E
91D
22
137A
98
35
19
20
21
10B
(Joins sheet 166)
2 450 000 FEET
550 000 FEET
(Joins sheet 149)
186
450 000 FEET

CHIPPEWA COUNTY, MICHIGAN NO. 148

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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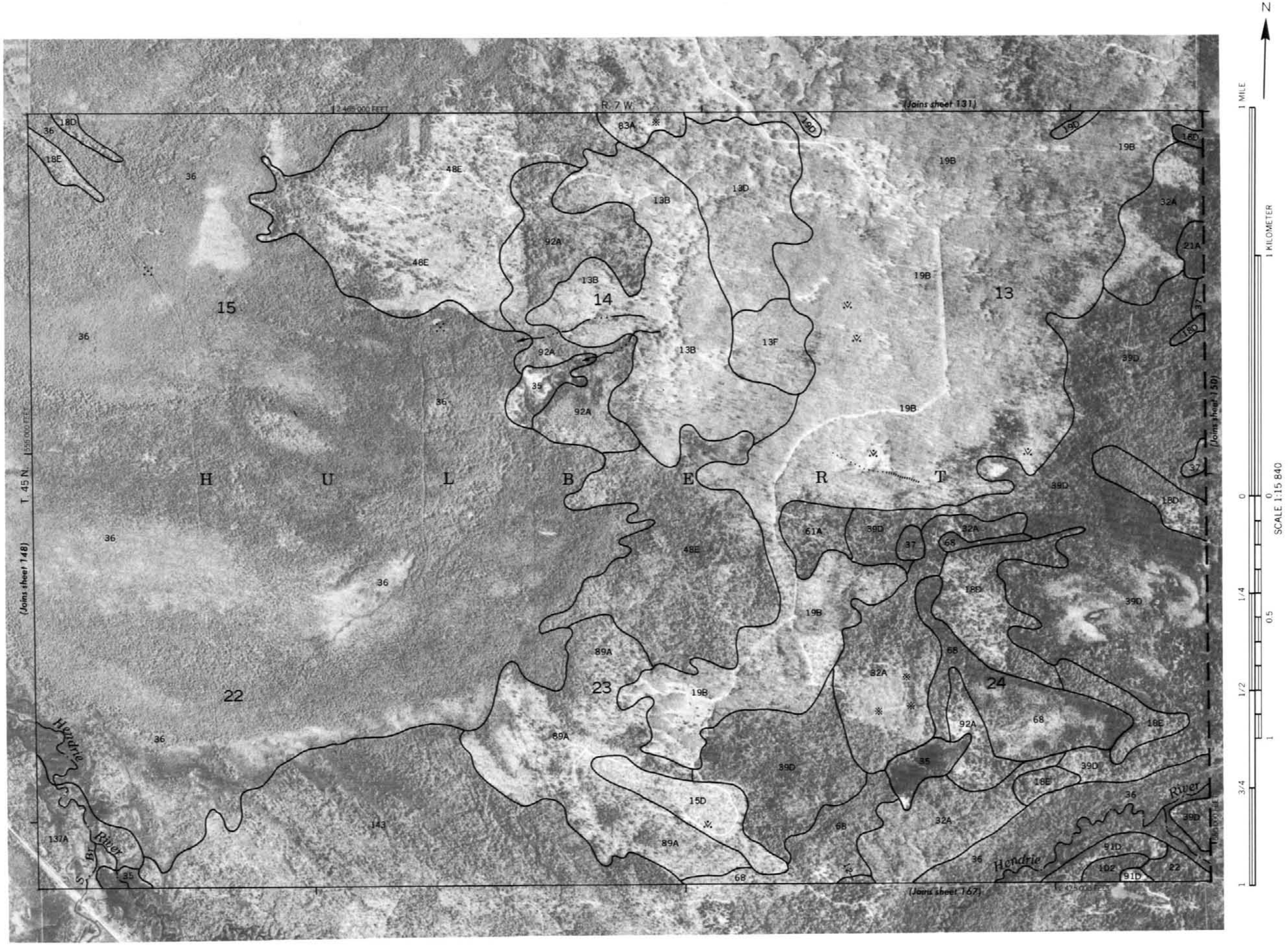
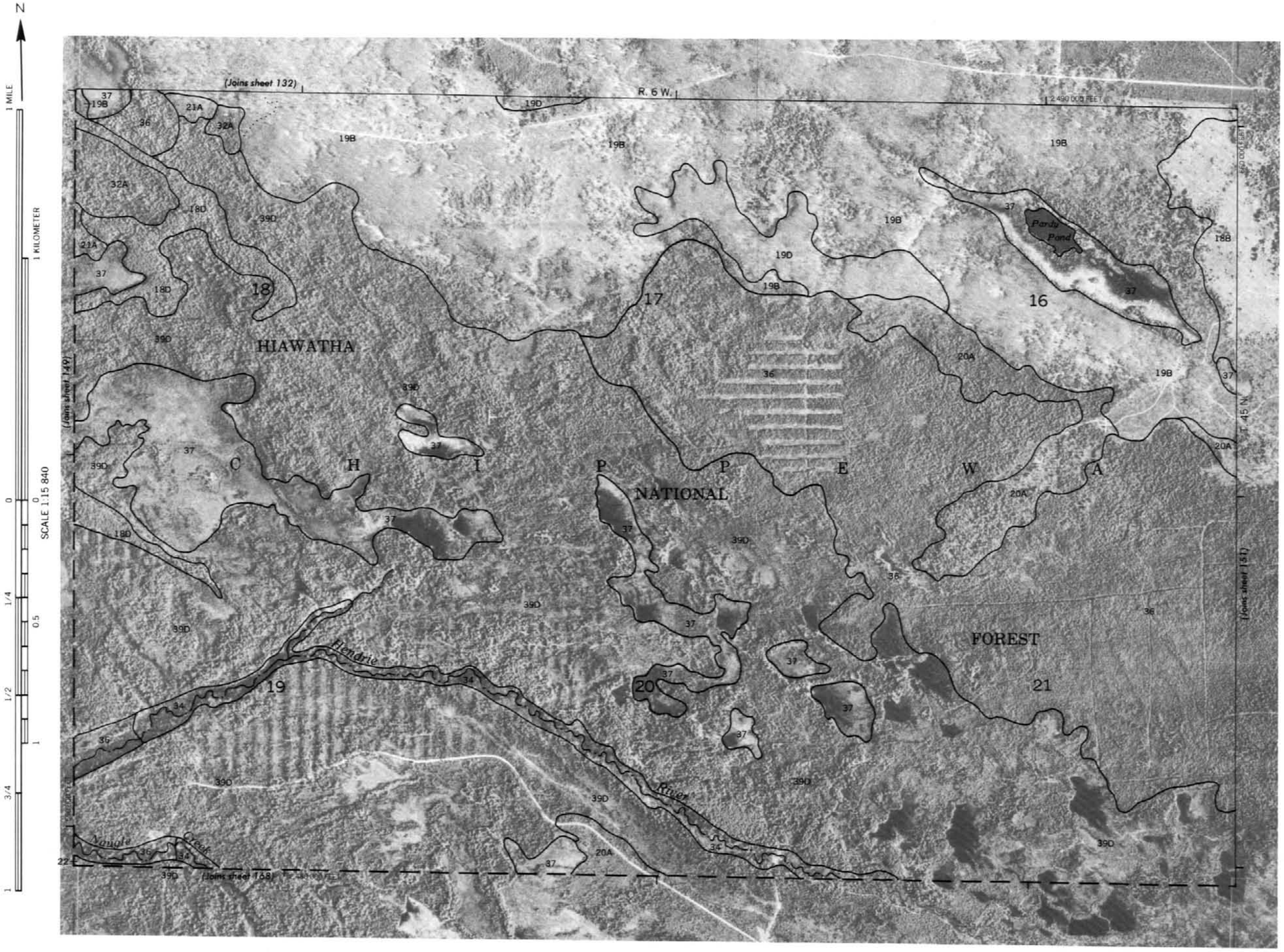
CHIPPEWA COUNTY, MICHIGAN NO. 149


149
N
R. 7 W.
2 480 000 FEET
(Joins sheet 131)
(Joins sheet 148)
(Joins sheet 150)
(Joins sheet 167)
T. 45 N.
555 000 FEET
H U L B E R T
15
14
13
22
23
24
36
18D
18E
48E
83A
13B
13D
19D
19B
32A
21A
37
92A
35
13F
39D
61A
68
89A
15D
143
137A
91D
102
22
Hendrie River
S. Br. River
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

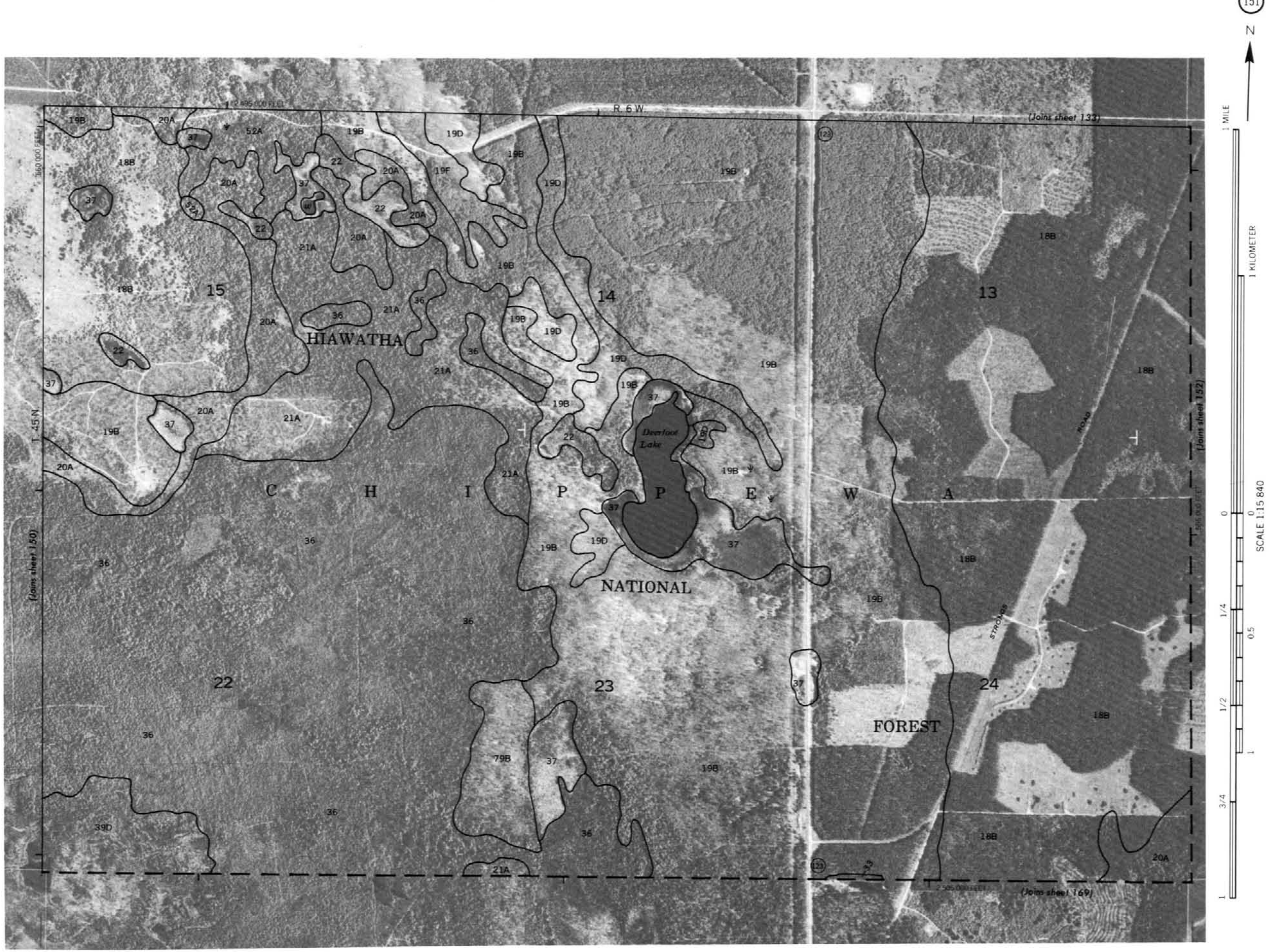

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 132)
R. 6 W.
2 490 000 FEET
(Joins sheet 149)
(Joins sheet 151)
(Joins sheet 168)
T. 45 N.
HIAWATHA
C H I P P E W A
NATIONAL
FOREST
Pardu Pond
Hendrie
River
Naugle
Creek
16
17
18
19
20
21
22
19B
19D
21A
32A
36
37
18D
39D
18B
20A
34

CHIPPEWA COUNTY, MICHIGAN NO. 150

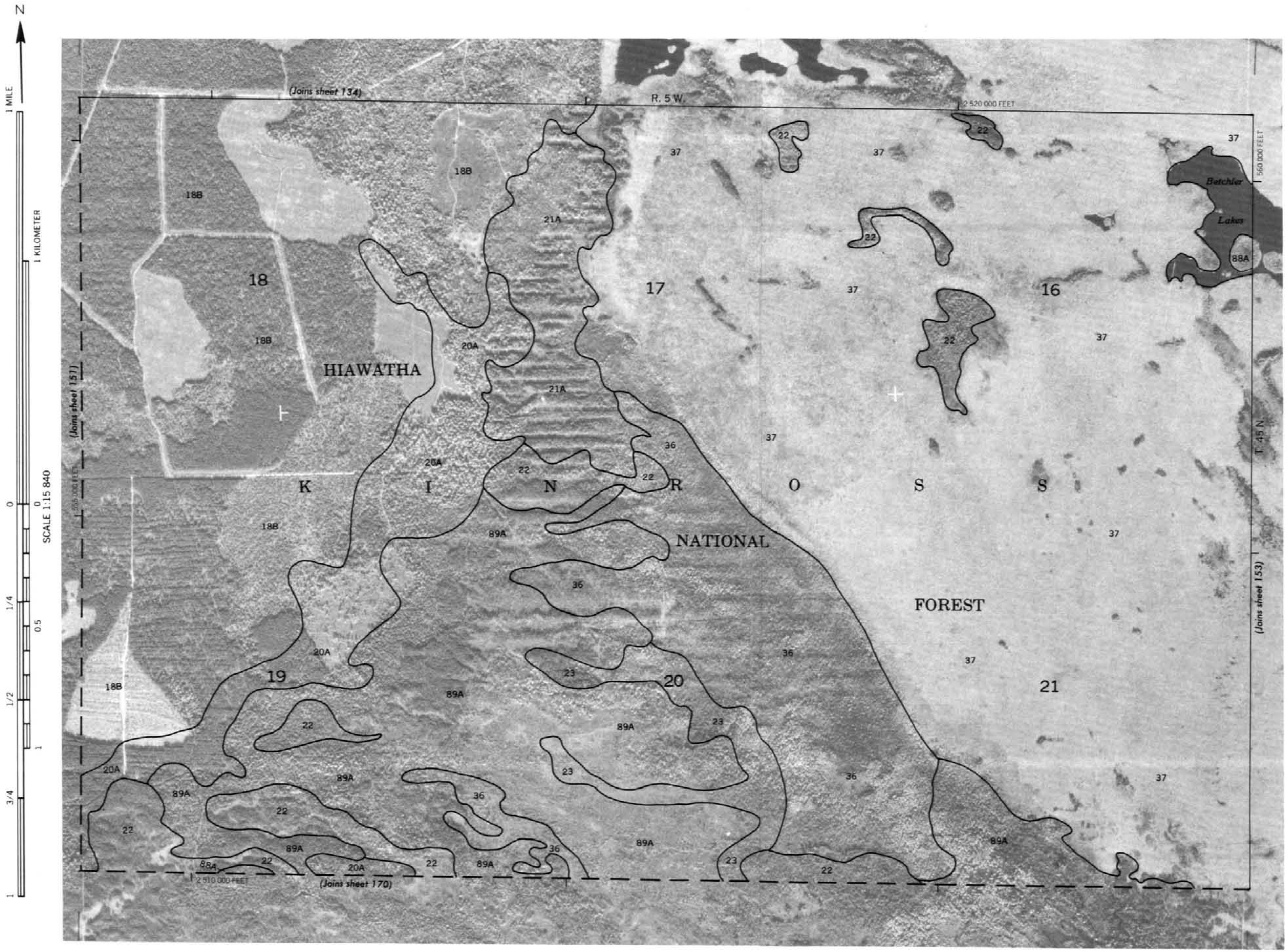
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 151


151
N
R. 6 W.
(Joins sheet 133)
(Joins sheet 150)
(Joins sheet 152)
(Joins sheet 169)
T. 45 N.
HIAWATHA
CHIPPEWA
NATIONAL
FOREST
Deerfoot Lake
ROAD
STRONGS
123
15
14
13
22
23
24
18B
19B
19D
19F
20A
21A
22
36
37
39D
52A
79B
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 152

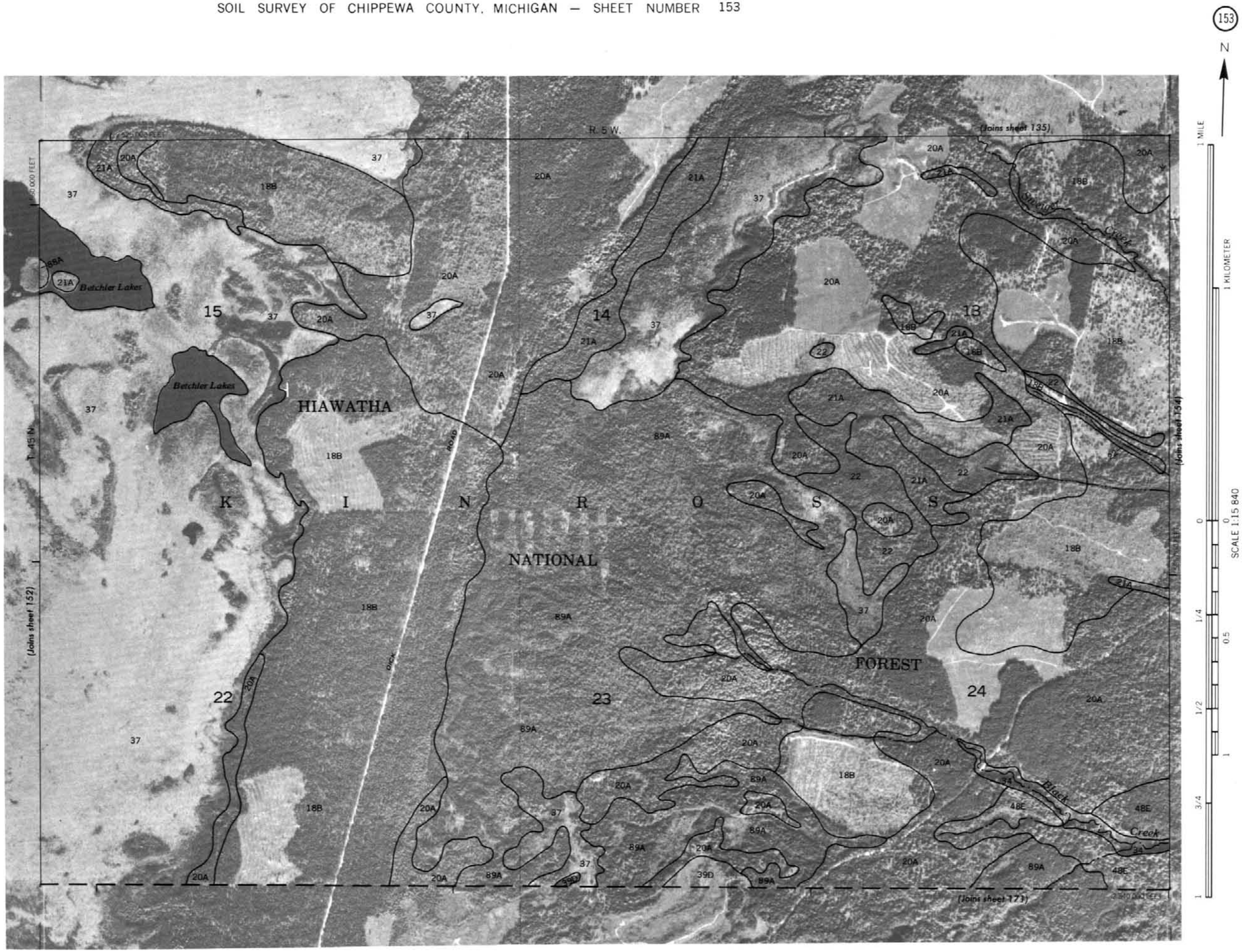

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 134)
R. 5 W.
2 520 000 FEET
560 000 FEET
(Joins sheet 151)
550 000 FEET
(Joins sheet 153)
T. 45 N.
(Joins sheet 170)
2 510 000 FEET
Betchler Lakes
HIAWATHA
K I N R O S S
NATIONAL
FOREST
18
17
16
19
20
21
18B
18B
18B
18B
18B
21A
21A
20A
20A
20A
20A
20A
22
22
22
22
22
22
22
22
22
22
22
22
22
23
23
23
23
36
36
36
36
36
36
37
37
37
37
37
37
37
37
37
37
88A
88A
89A
89A
89A
89A
89A
89A
89A
89A
89A
89A

CHIPPEWA COUNTY, MICHIGAN NO. 152

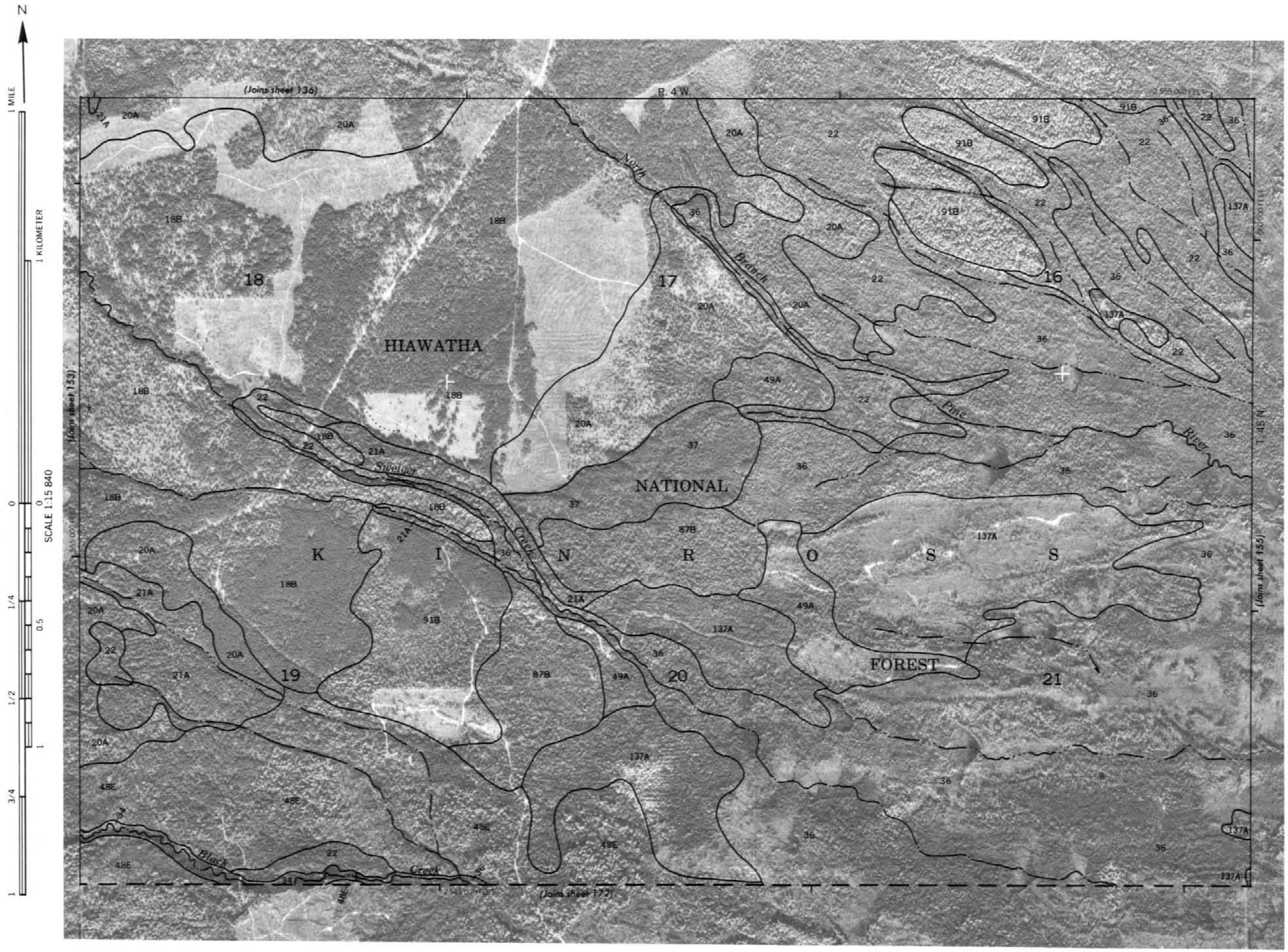
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 153

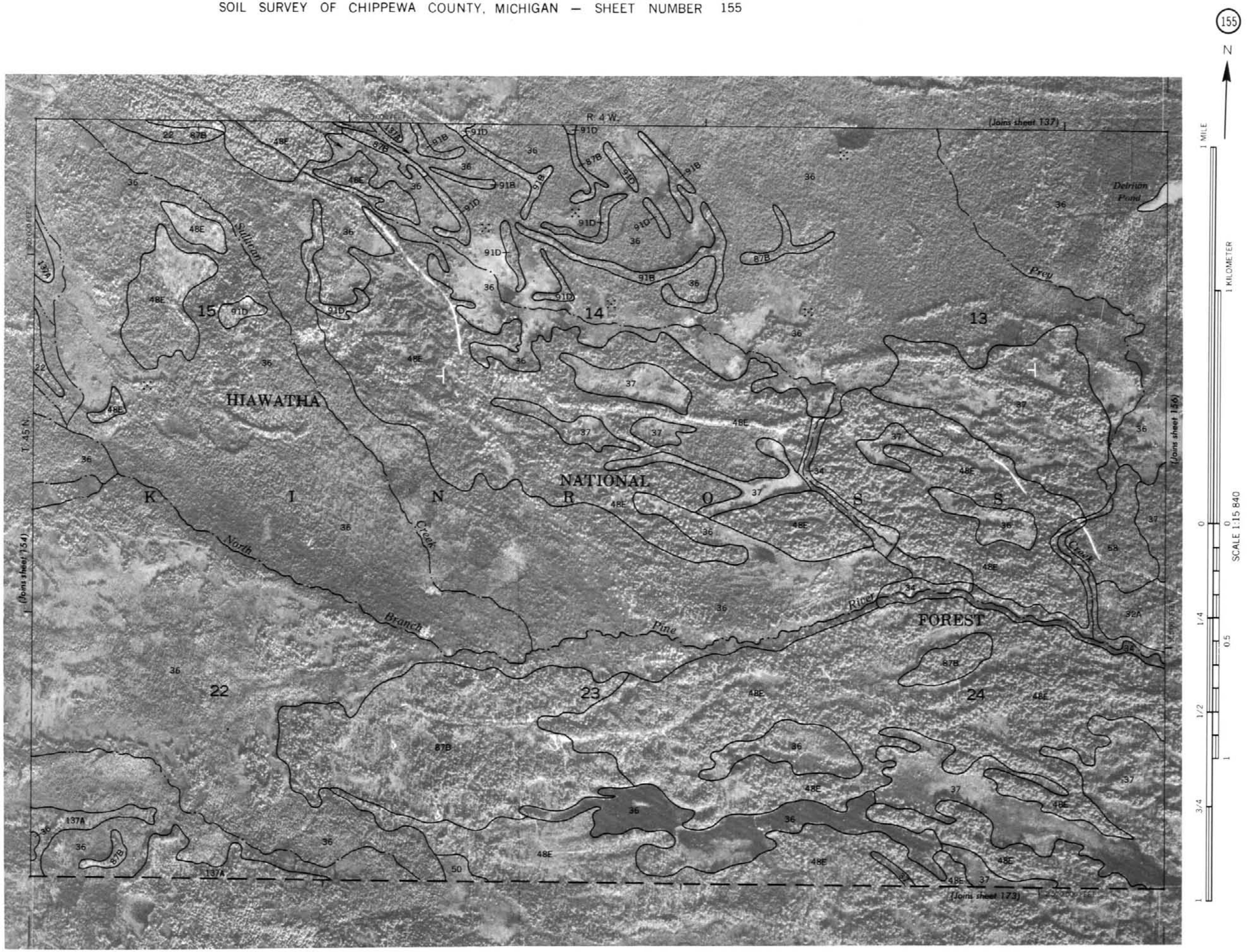

153
N
R. 5 W.
T. 45 N.
(Joins sheet 135)
(Joins sheet 152)
(Joins sheet 154)
(Joins sheet 171)
Betchler Lakes
Betchler Lakes
HIAWATHA
K I N R O S S
NATIONAL
FOREST
ROAD
DICK
Black Creek
Creek
15
14
13
22
23
24
37
21A
20A
18B
88A
89A
22
39D
34
48E
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 154


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 136)
R. 4 W.
(Joins sheet 153)
(Joins sheet 155)
(Joins sheet 172)
T. 45 N.
HIAWATHA
NATIONAL
FOREST
K I N R O S S
18
17
16
19
20
21
North Branch
Pine River
Sweiger Creek
Black Creek
20A
21A
22
18B
36
37
49A
87B
91B
137A
48E
34

CHIPPEWA COUNTY, MICHIGAN NO. 154

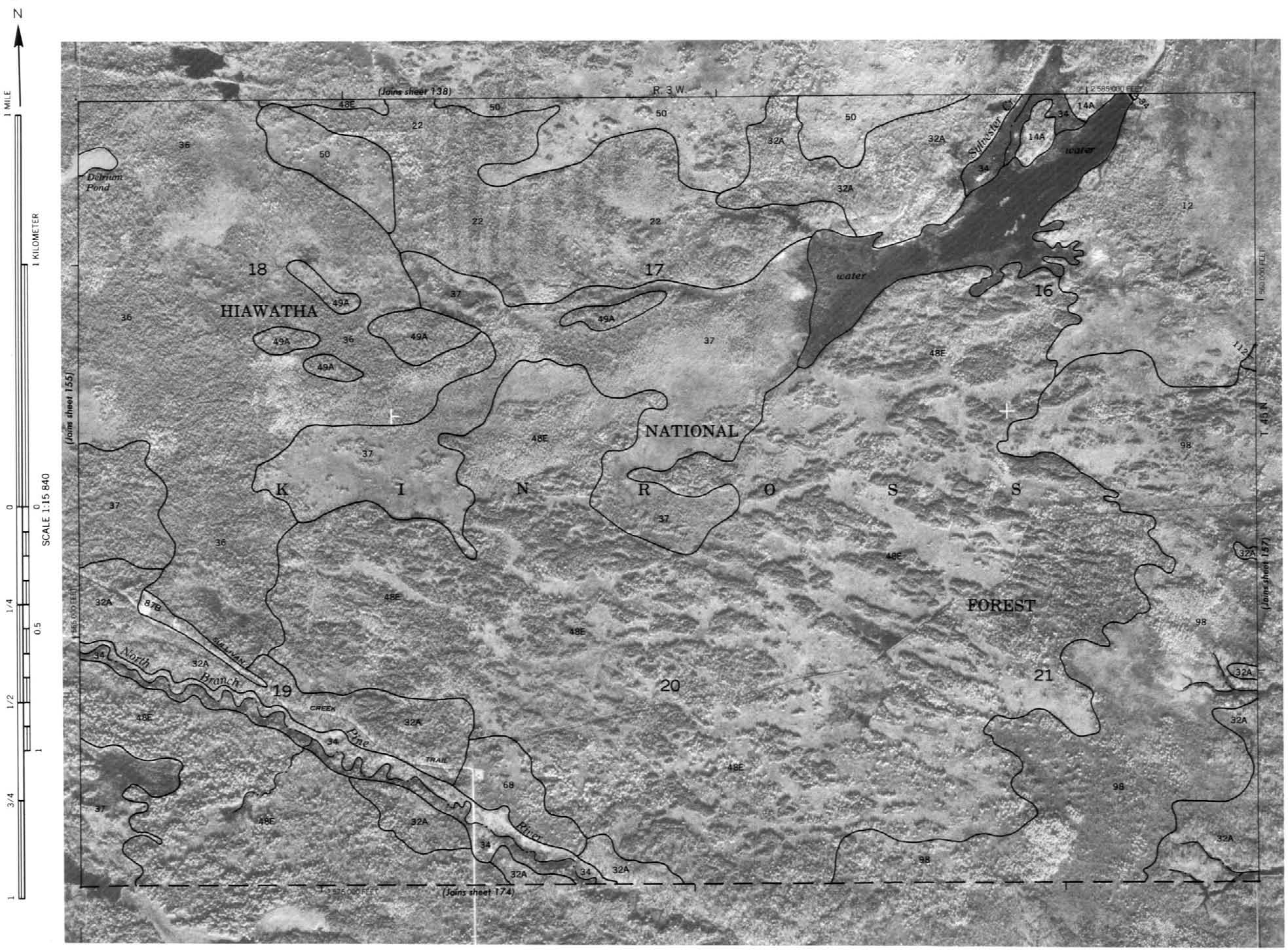
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


155
N
R. 4 W.
T. 45 N.
(Joins sheet 137)
(Joins sheet 156)
(Joins sheet 173)
(Joins sheet 154)
HIAWATHA
NATIONAL
FOREST
K I N R O S S
Detrion Pond
Sullivan Creek
North Branch
Pine River
Frey Creek
13
14
15
22
23
24
22
36
37
34
48E
50
58
32A
87B
91B
91D
137A
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 155

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 156

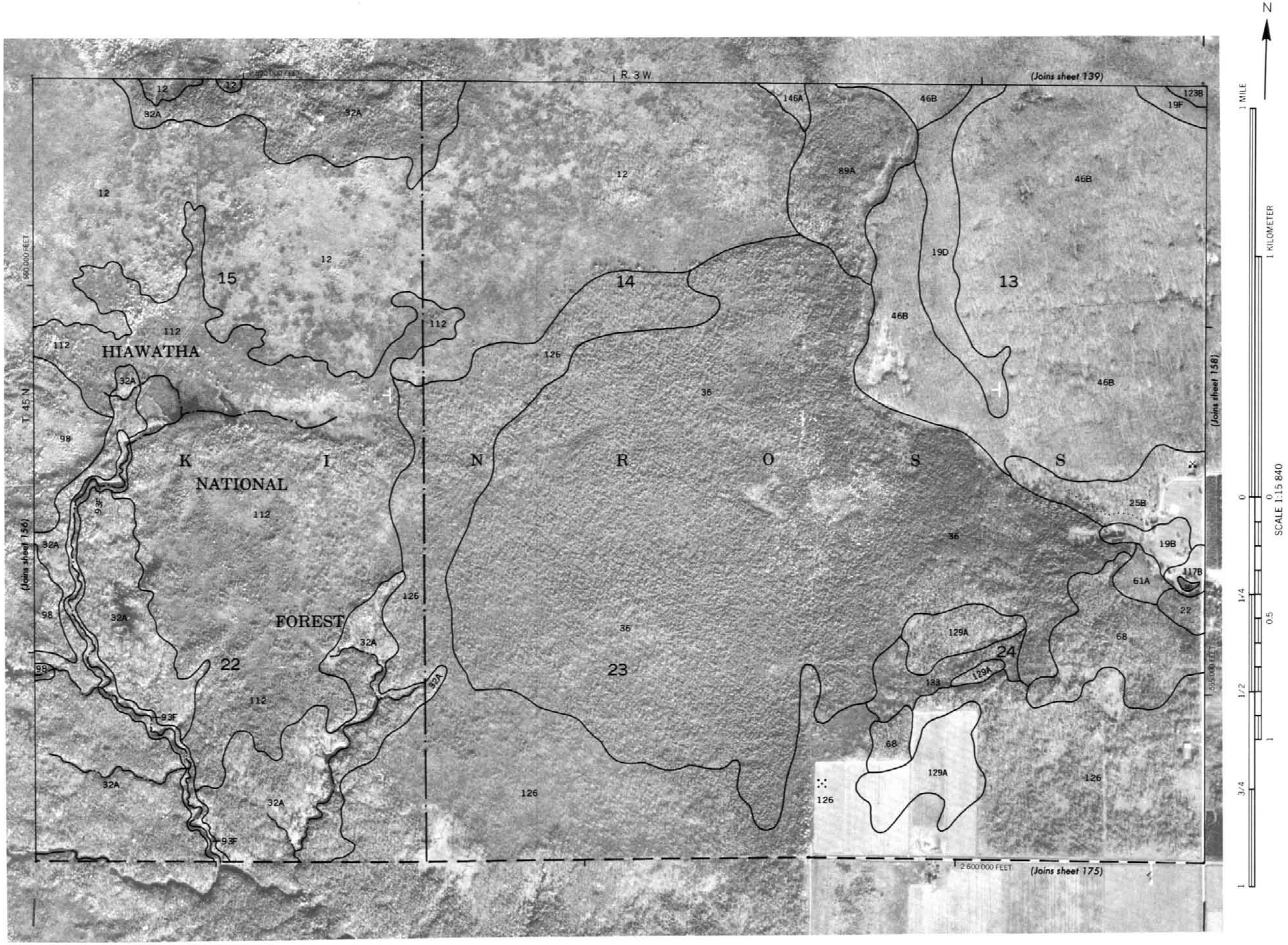

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 138)
R. 3 W.
(Joins sheet 155)
(Joins sheet 157)
(Joins sheet 174)
T. 45 N.
Delirium Pond
HIAWATHA
NATIONAL
K I N R O S S
FOREST
18
17
16
19
20
21
water
Sylvester Cr.
North Branch
Pine River
CREEK
TRAIL
36
50
22
48E
49A
37
32A
34
14A
12
112
98
87B
68

CHIPPEWA COUNTY, MICHIGAN NO. 156

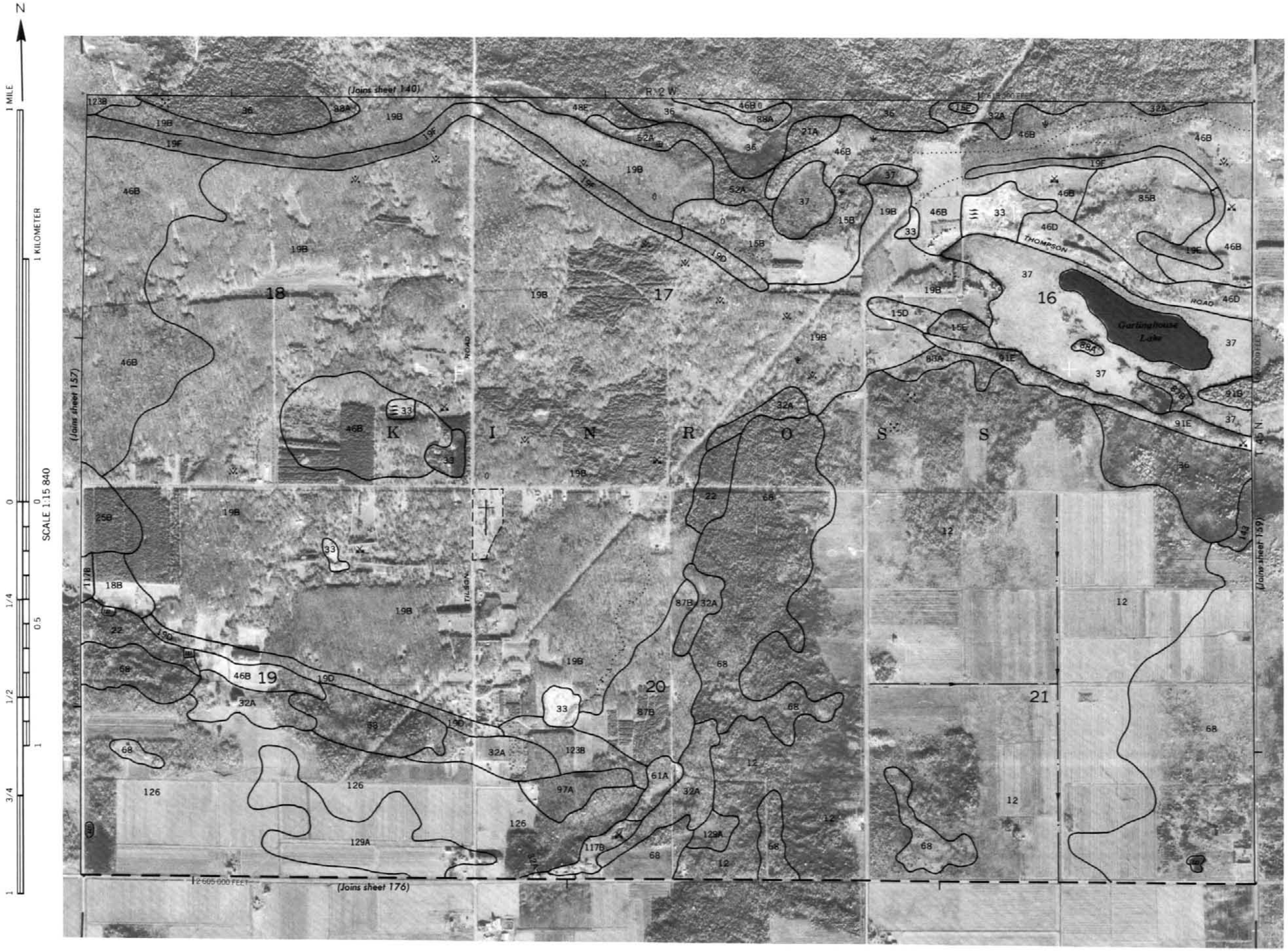
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 157


N
R. 3 W.
(Joins sheet 139)
(Joins sheet 156)
(Joins sheet 158)
(Joins sheet 175)
T. 45 N.
2 600 000 FEET
550 000 FEET
535 000 FEET
HIAWATHA
NATIONAL
FOREST
K I N R O S S
13
14
15
22
23
24
12
32A
112
98
93F
126
36
146A
46B
89A
19D
123B
19F
25B
19B
117B
61A
6B
129A
133
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

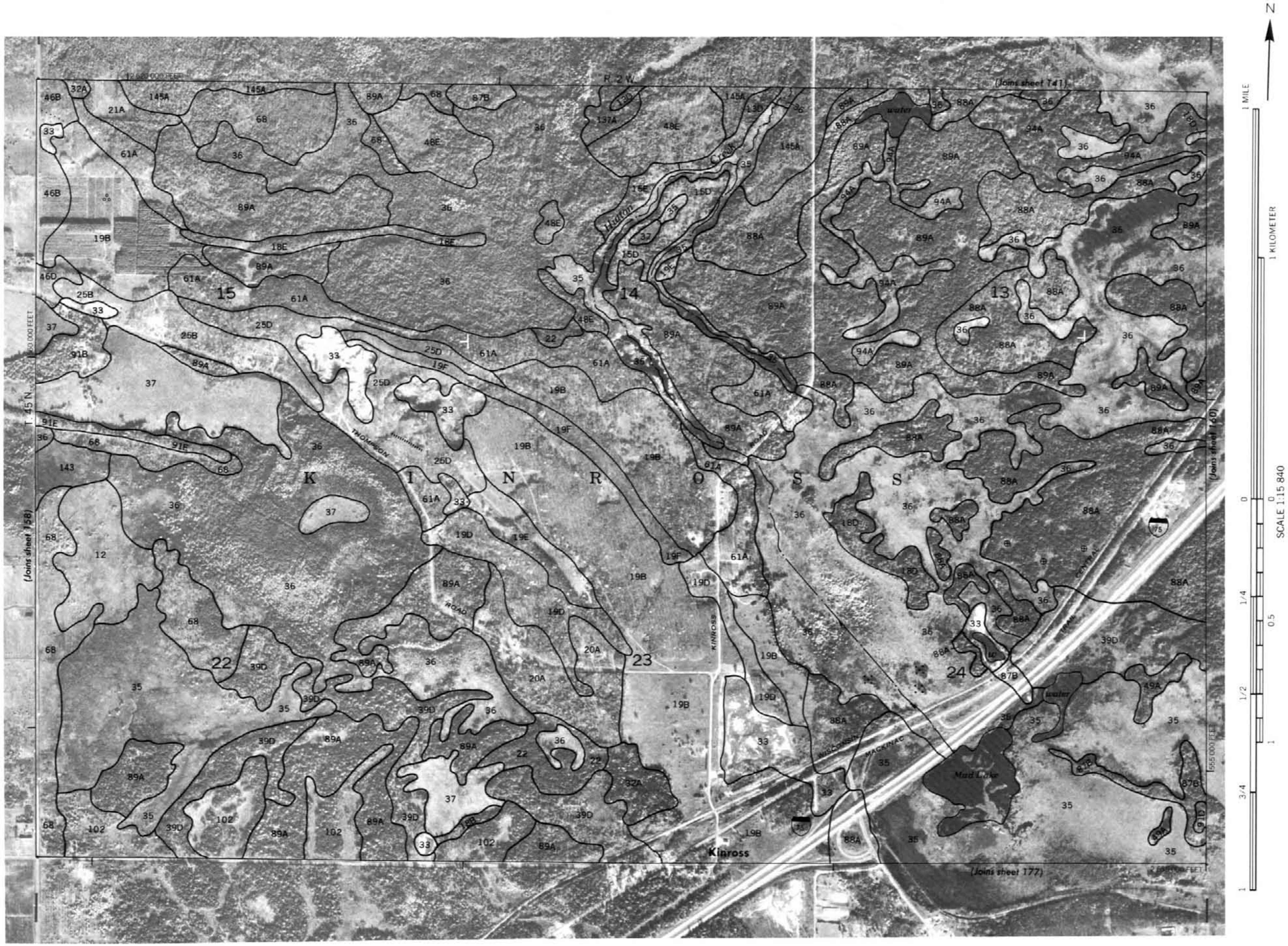
SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 158


N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840
(Joins sheet 140)
(Joins sheet 157)
(Joins sheet 159)
(Joins sheet 176)
R. 2 W.
T. 45 N.
2 605 000 FEET
KINROSS
18
17
16
19
20
21
THOMPSON ROAD
TILSON ROAD
Gartinghouse Lake
123B
19B
19F
36
88A
48E
52A
46B
21A
37
15B
15E
32A
85B
46D
33
19D
15D
91E
91B
87B
36
46B
32A
22
68
12
25B
18B
117B
19D
87B
123B
97A
61A
126
129A
117B
14
0

CHIPPEWA COUNTY, MICHIGAN NO. 158

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

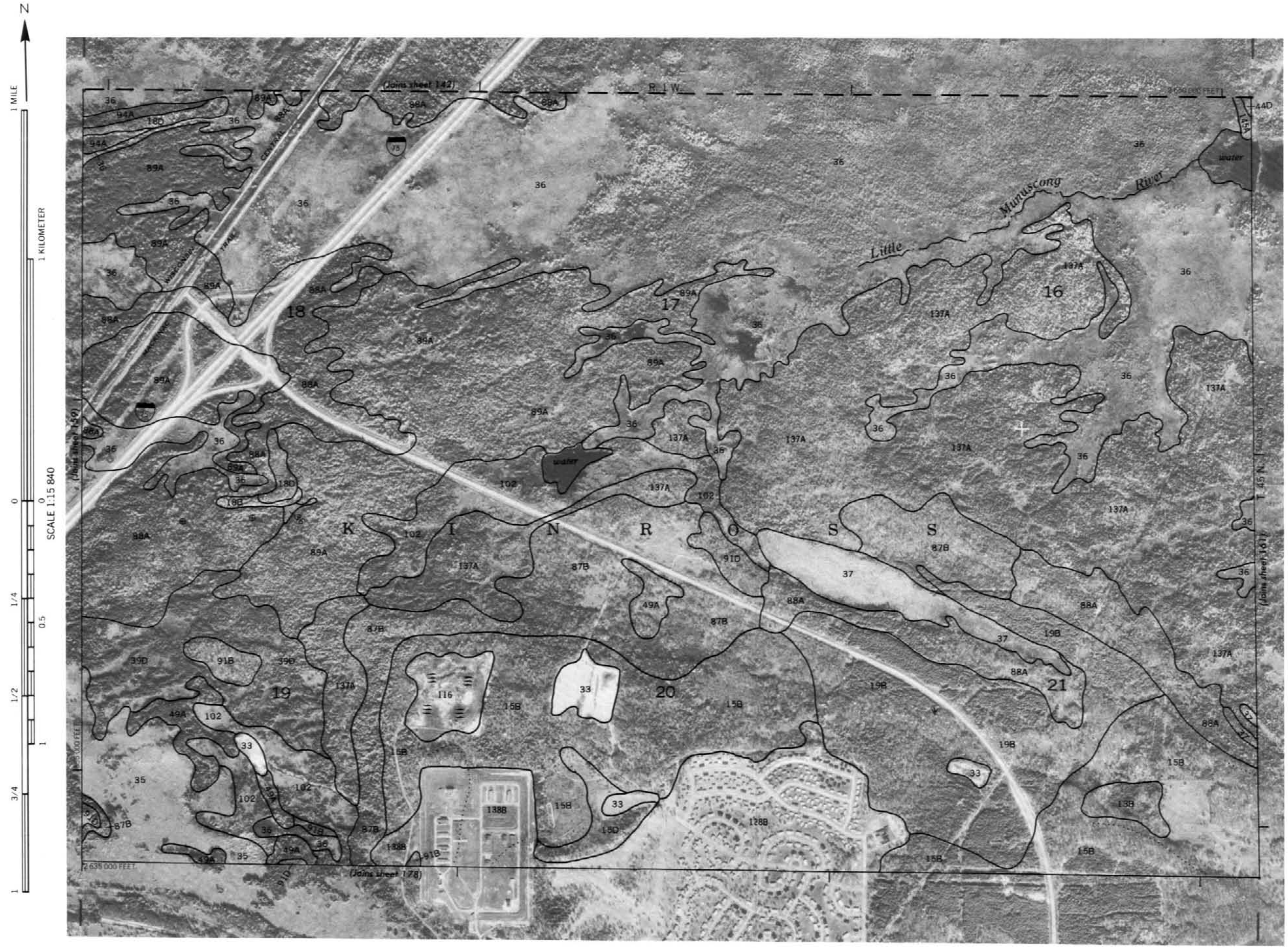
SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 159


N
1 MILE
1 KILOMETER
0
0
1/4
0.5
1/2
3/4
1
1
SCALE 1:15 840
(Joins sheet 141)
(Joins sheet 160)
(Joins sheet 177)
(Joins sheet 158)
R. 2 W.
T. 45 N.
K I N R O S S
Kinross
15
14
13
22
23
24
Huron Creek
Mud Lake
water
THOMPSON ROAD
KINROSS
WISCONSIN
MACKINAC
75
46B
32A
21A
145A
68
89A
87B
137A
48E
13D
145A
36
33
61A
46B
19B
18E
89A
61A
46D
25B
33
25D
37
91B
37
89A
33
25D
19F
61A
19B
91E
36
68
91E
143
68
36
37
61A
33
19D
19E
12
68
36
89A
68
68
22
39D
35
89A
36
20A
19D
23
20A
19B
35
39D
39D
36
89A
39D
89A
22
36
22
32A
37
39D
102
89A
102
89A
33
102
89A
35
39D
102
68
88A
94A
89A
36
88A
35
15D
15E
15D
37
88A
89A
61A
89A
88A
13
36
94A
18D
18D
36
33
87B
39D
49A
35
35
88A
33
19B
19D
19B
33
88A
35
35
35
87B
49A
91D

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

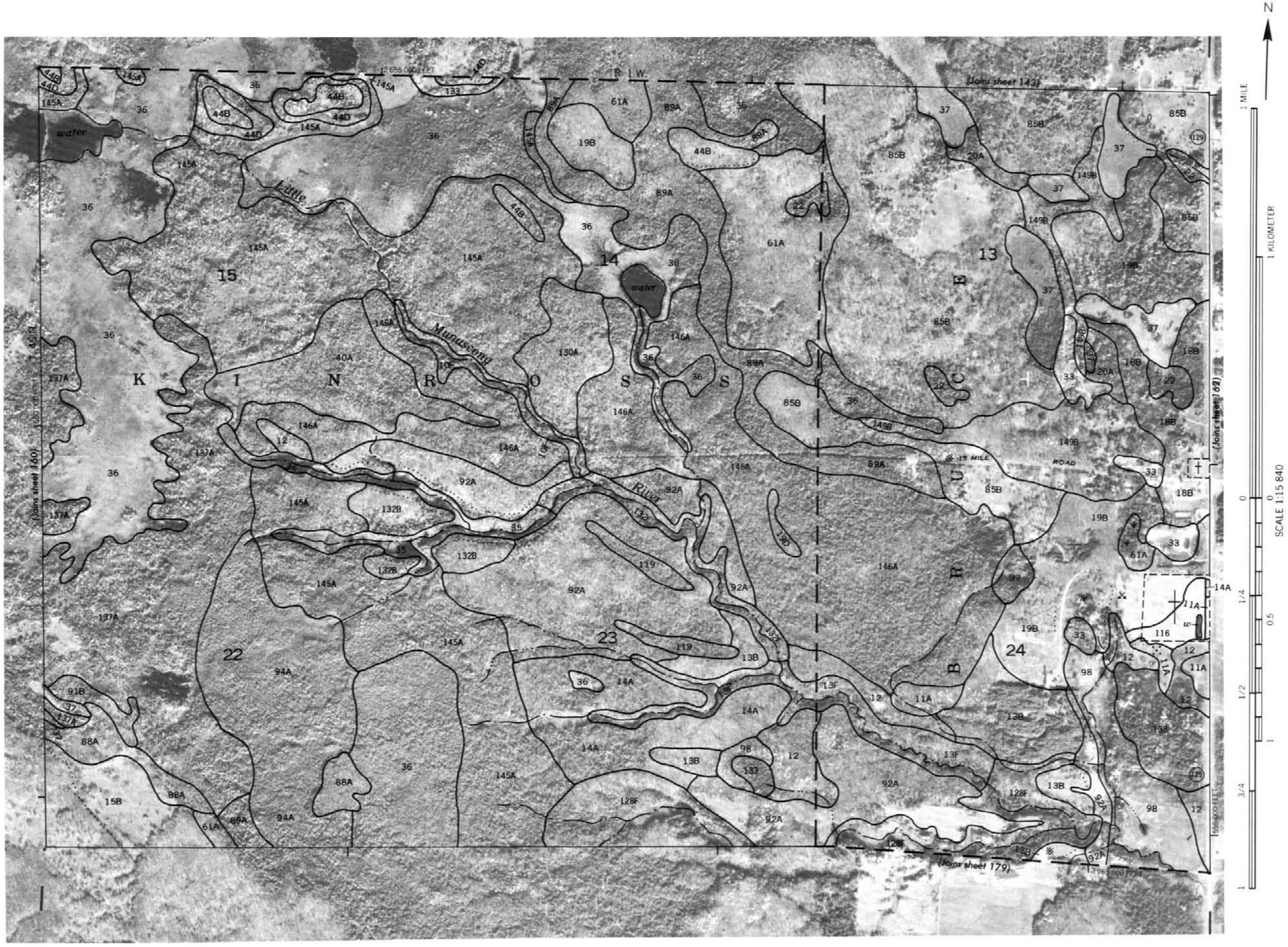
CHIPPEWA COUNTY, MICHIGAN NO. 159

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 160


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
(Joins sheet 142)
R. 1 W.
(Joins sheet 159)
(Joins sheet 161)
(Joins sheet 178)
T. 45 N.
2 635 000 FEET
44D
Little
Munuscong
River
water
K I N R O S S
16
17
18
19
20
21
36
89A
88A
94A
18D
137A
102
87B
91D
37
49A
19B
39D
91B
33
116
15B
13B
138B
128B
35
15D
18B

CHIPPEWA COUNTY, MICHIGAN NO. 160

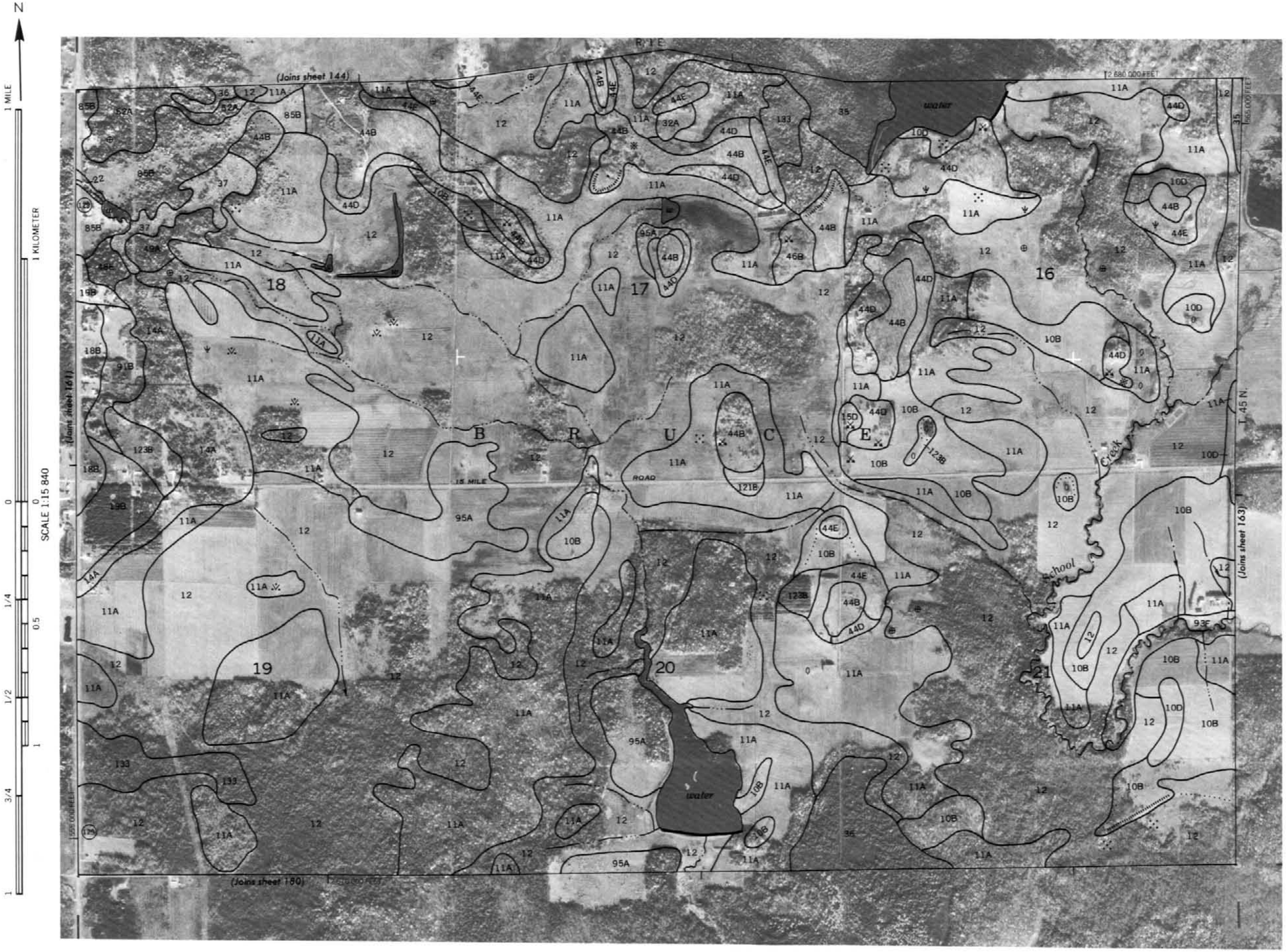
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
(Joins sheet 143)
(Joins sheet 162)
(Joins sheet 179)
(Joins sheet 160)
R 1 W.
T 45 N.
12 655 000 FEET
555 000 FEET
K I N R O S S
B R U C E
15
14
13
22
23
24
water
Little
Munuscong
River
15 MILE ROAD
36
145A
44B
44D
133
61A
89A
19B
85B
37
20A
149B
129
22
146A
130A
40A
137A
12
92A
132B
35
119
190
18B
33
14A
11A
116
w
13B
13F
98
128F
94A
91B
88A
88A
15B
61A
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

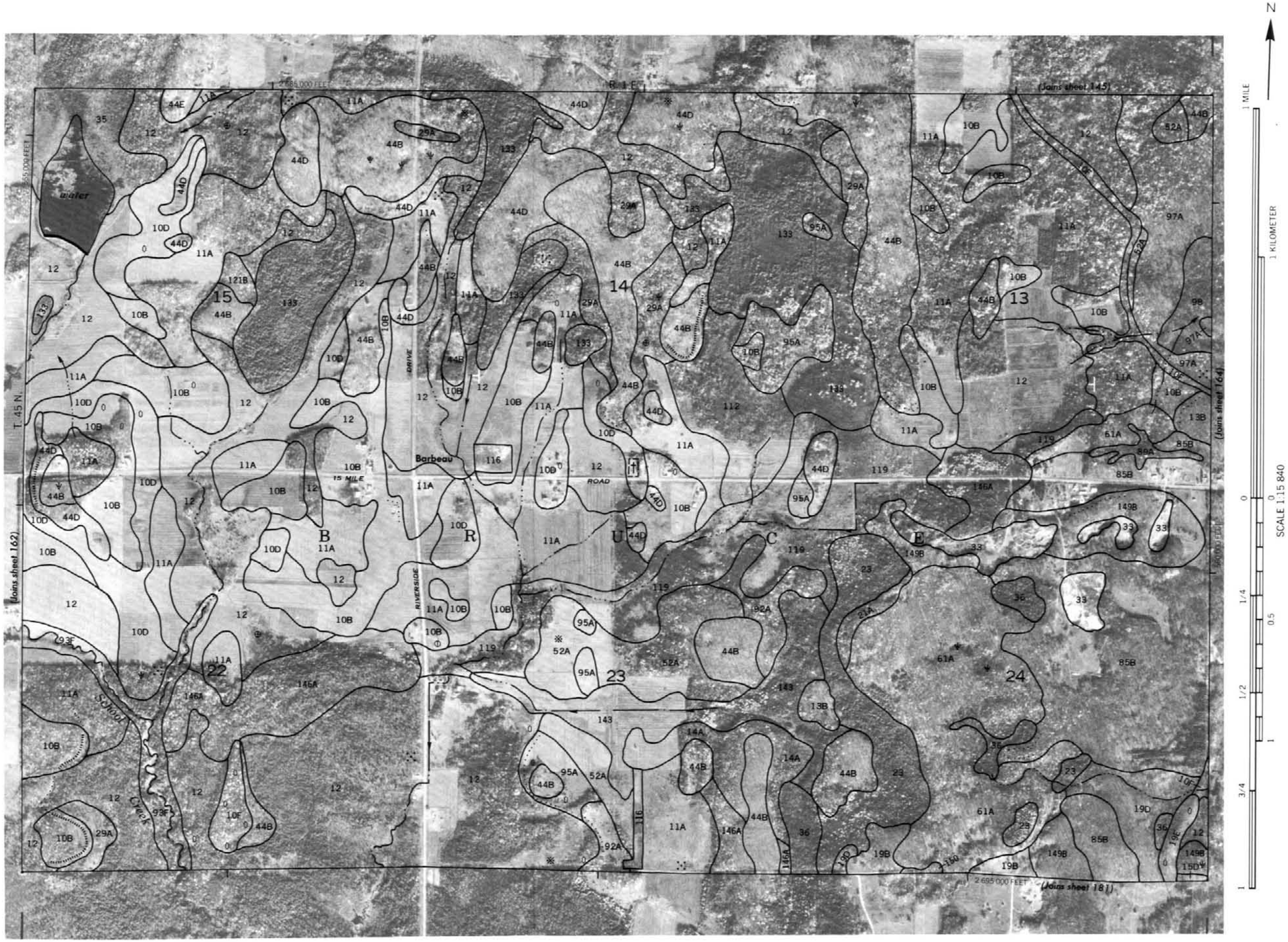
CHIPPEWA COUNTY, MICHIGAN NO. 161

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 162


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
R 1 E
T 45 N
(Joins sheet 144)
(Joins sheet 141)
(Joins sheet 163)
(Joins sheet 180)
2 680 000 FEET
B R U C E
15 MILE ROAD
School Creek
water
16
17
18
19
20
21

CHIPPEWA COUNTY, MICHIGAN NO. 162

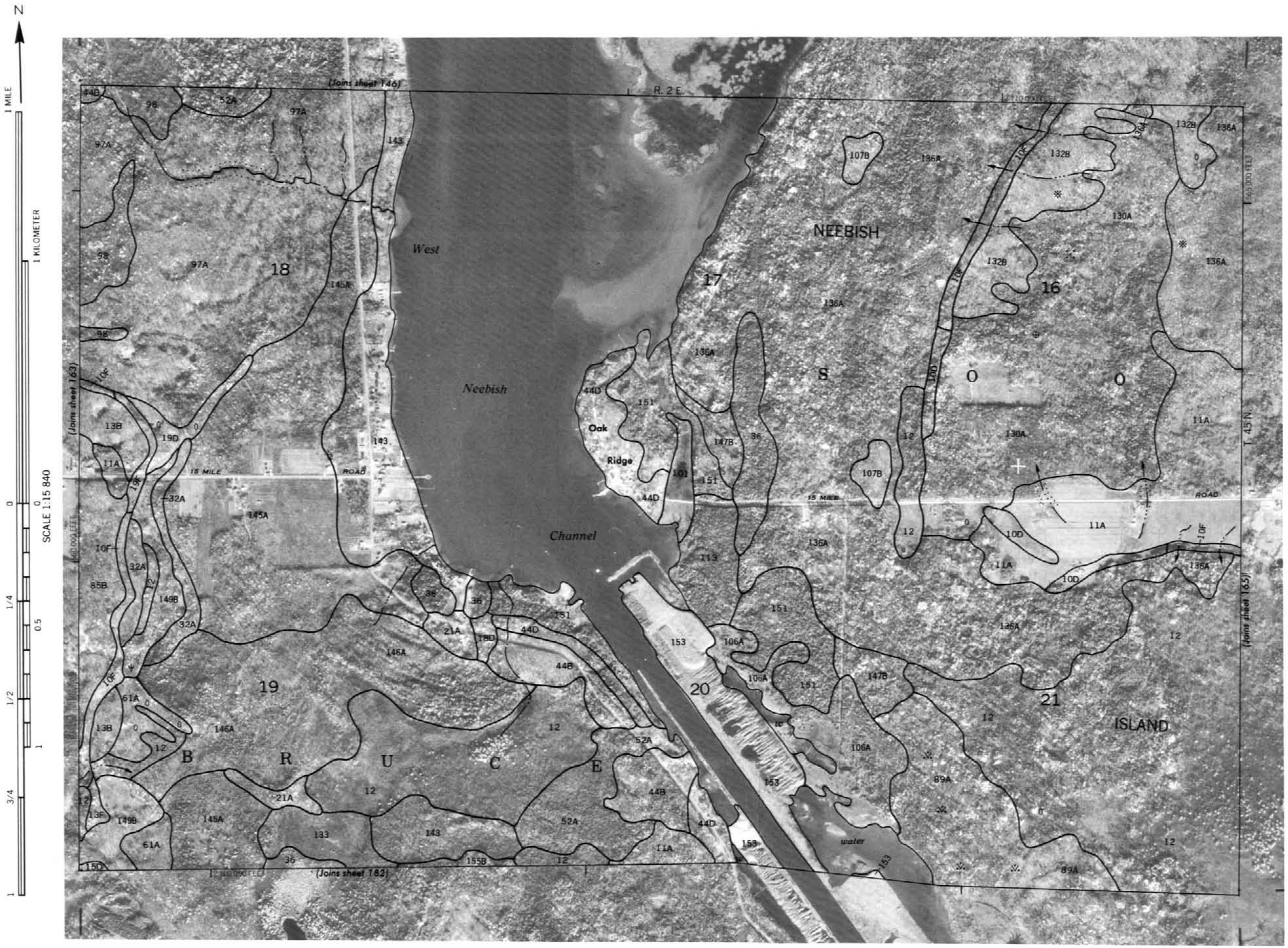
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
R. 1 E.
T. 45 N.
(Joins sheet 145)
(Joins sheet 164)
(Joins sheet 162)
(Joins sheet 181)
2 695 000 FEET
565 000 FEET
water
Barbeau
15 MILE
ROAD
DRIVE
RIVERSIDE
School
Creek
15
14
13
22
23
24
B
R
U
C
E

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 163

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 164

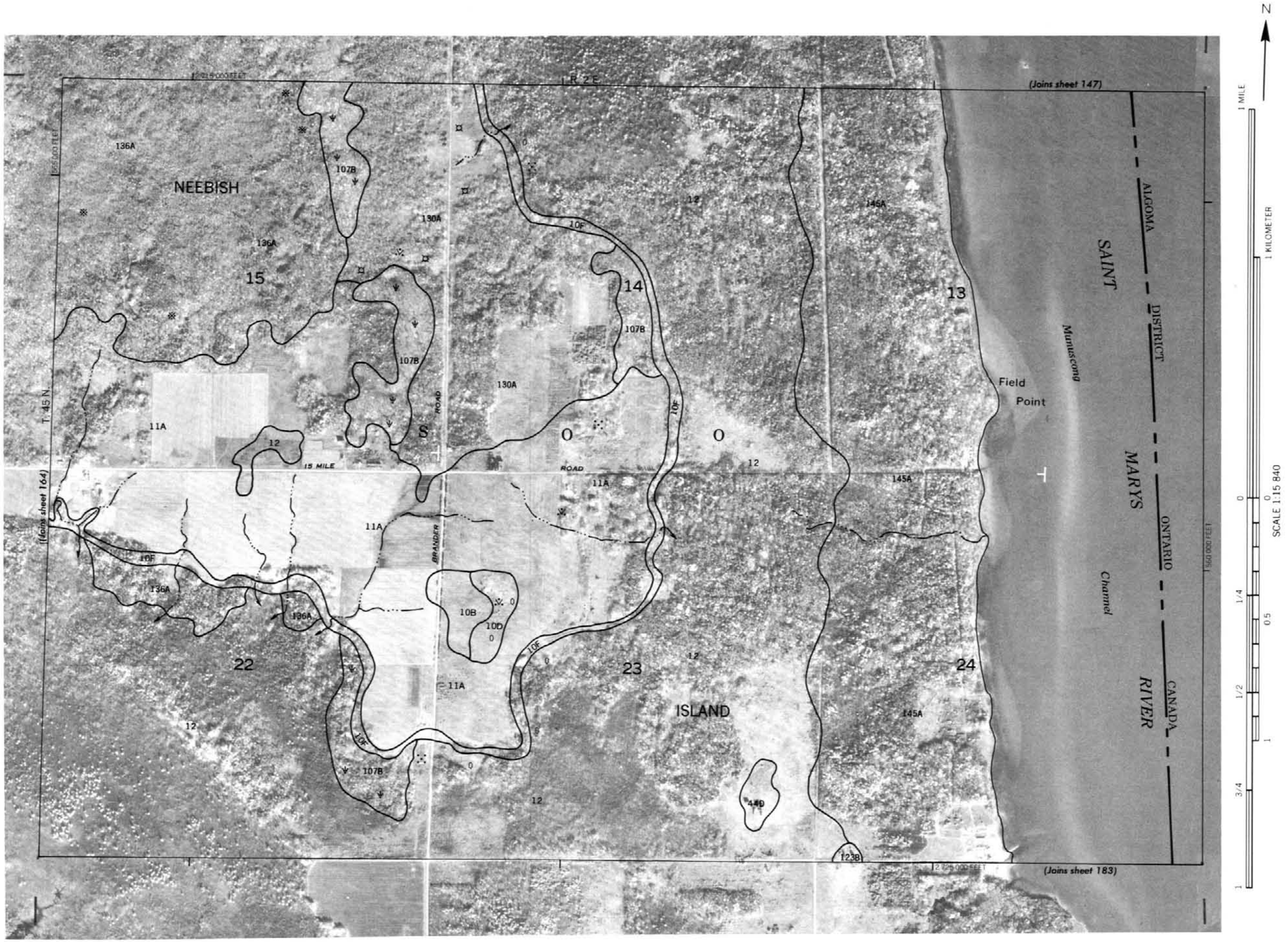

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 146)
(Joins sheet 163)
(Joins sheet 165)
(Joins sheet 182)
R. 2 E.
T. 45 N.
NEEBISH
ISLAND
S O O
B R U C E
West
Neebish
Channel
Oak
Ridge
15 MILE
ROAD
water
18
17
16
19
20
21
44B
98
52A
97A
143
145A
10F
13B
11A
19D
32A
85B
149B
61A
146A
21A
36
18D
44D
151
12
52A
44B
133
143
155B
15D
13F
101
147B
113
153
106A
107B
136A
132B
130A
10D
11A
89A
0

CHIPPEWA COUNTY, MICHIGAN NO. 164

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 165

165

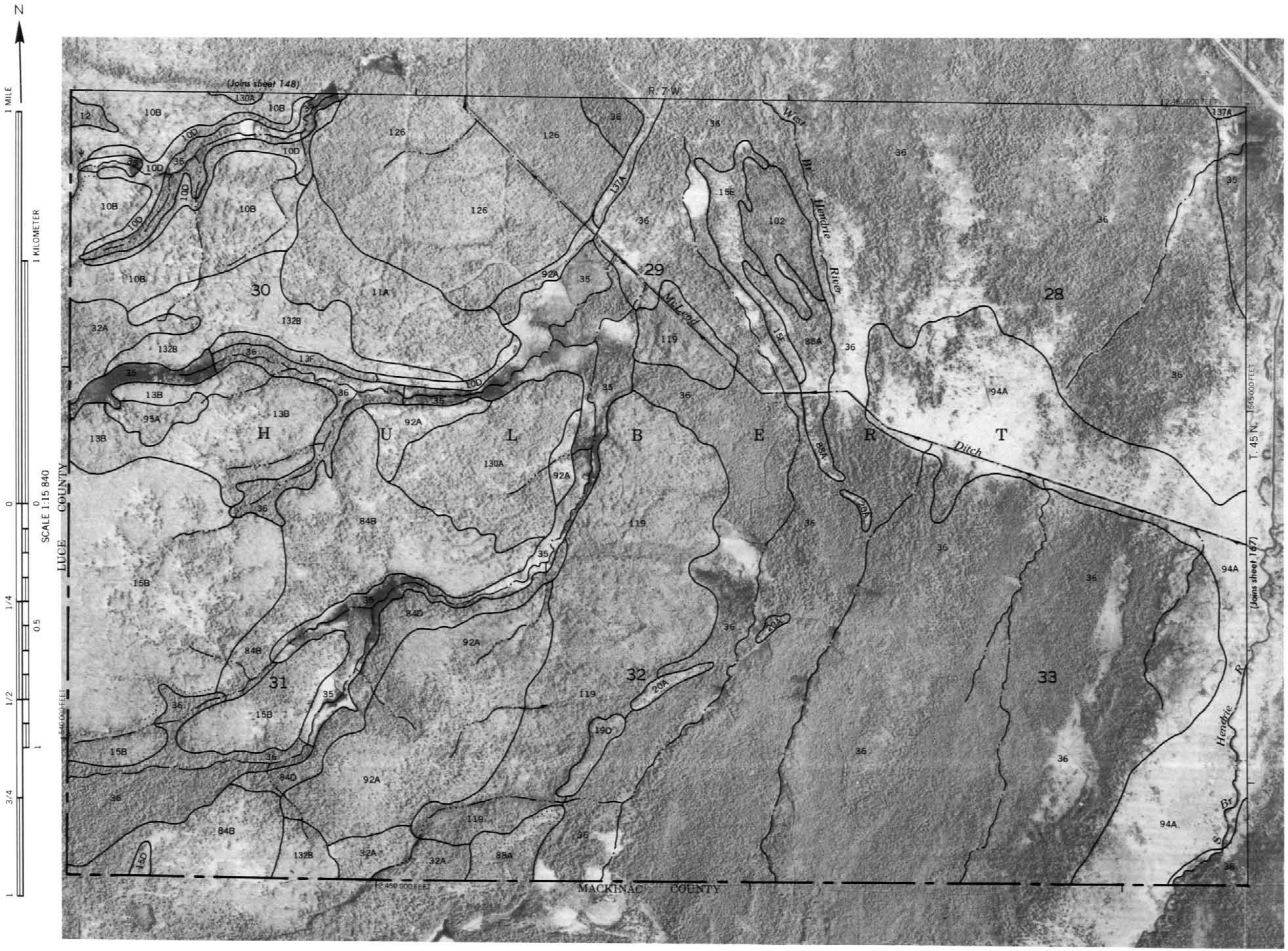


N
(Joins sheet 147)
(Joins sheet 164)
(Joins sheet 183)
R 2 E
T. 45 N.
2 575 000 FEET
560 000 FEET
NEEBISH
ISLAND
15 MILE ROAD
BRANDER ROAD
15
14
13
22
23
24
136A
107B
130A
12
145A
10F
11A
10B
10D
44D
123B
S
O
Field Point
Munuscong Channel
SAINT MARYS RIVER
ALGOMA DISTRICT
ONTARIO CANADA
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 165

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 166

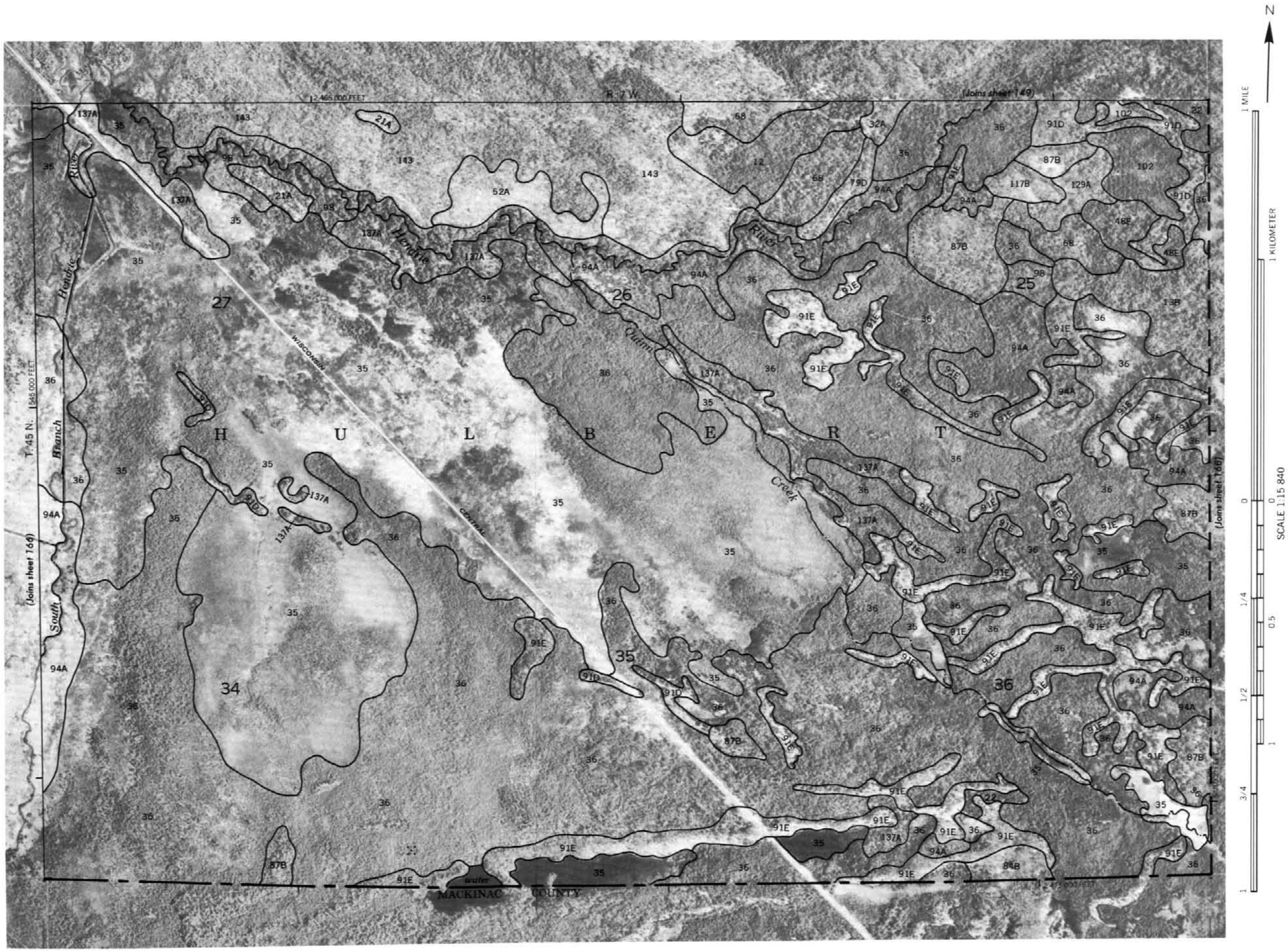

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
0.5
1/2
1
3/4
1
(Joins sheet 148)
(Joins sheet 167)
R. 7 W.
T. 45 N.
LUCE COUNTY
MACKINAC COUNTY
H U L B E R T
West Br Hendrie River
McLeod Ditch
Hendrie R
S Br
29
30
28
31
32
33
10B
10D
11A
12
13B
13F
15B
15E
15D
19D
20A
32A
35
36
84B
84D
88A
92A
94A
95A
102
119
126
130A
132B
137A

CHIPPEWA COUNTY, MICHIGAN NO. 166

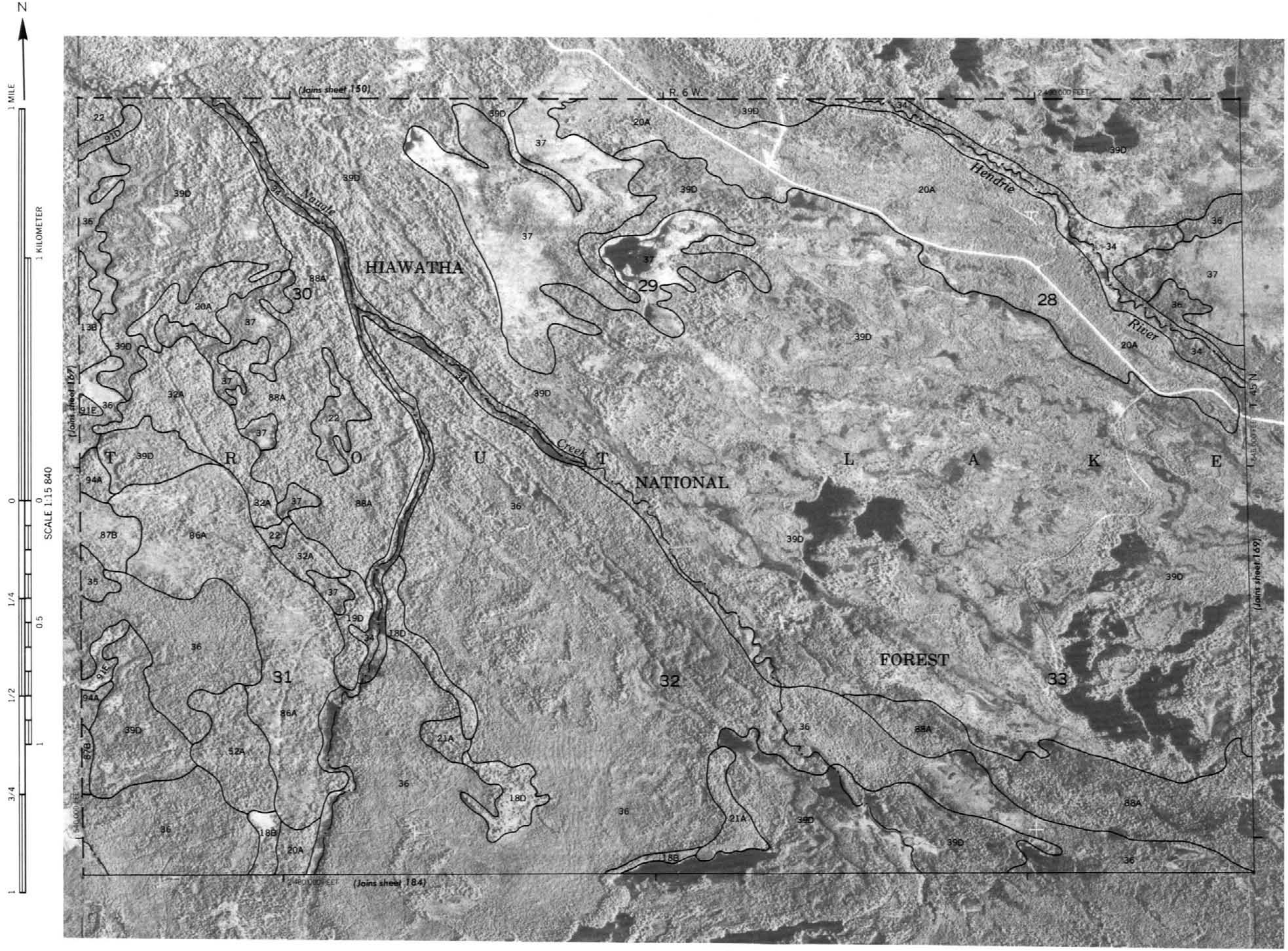
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 167


N
2 465 000 FEET
R. 7 W.
(Joins sheet 149)
(Joins sheet 166)
(Joins sheet 168)
T. 45 N.
545 000 FEET
H U L B E R T
Hendrie River
South Branch
Quinn Creek
WISCONSIN CENTRAL
27
26
25
34
35
36
water
MACKINAC COUNTY
137A
143
21A
52A
68
12
32A
79D
94A
91D
91E
87B
117B
129A
102
48E
13B
22
9B
84B
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 168

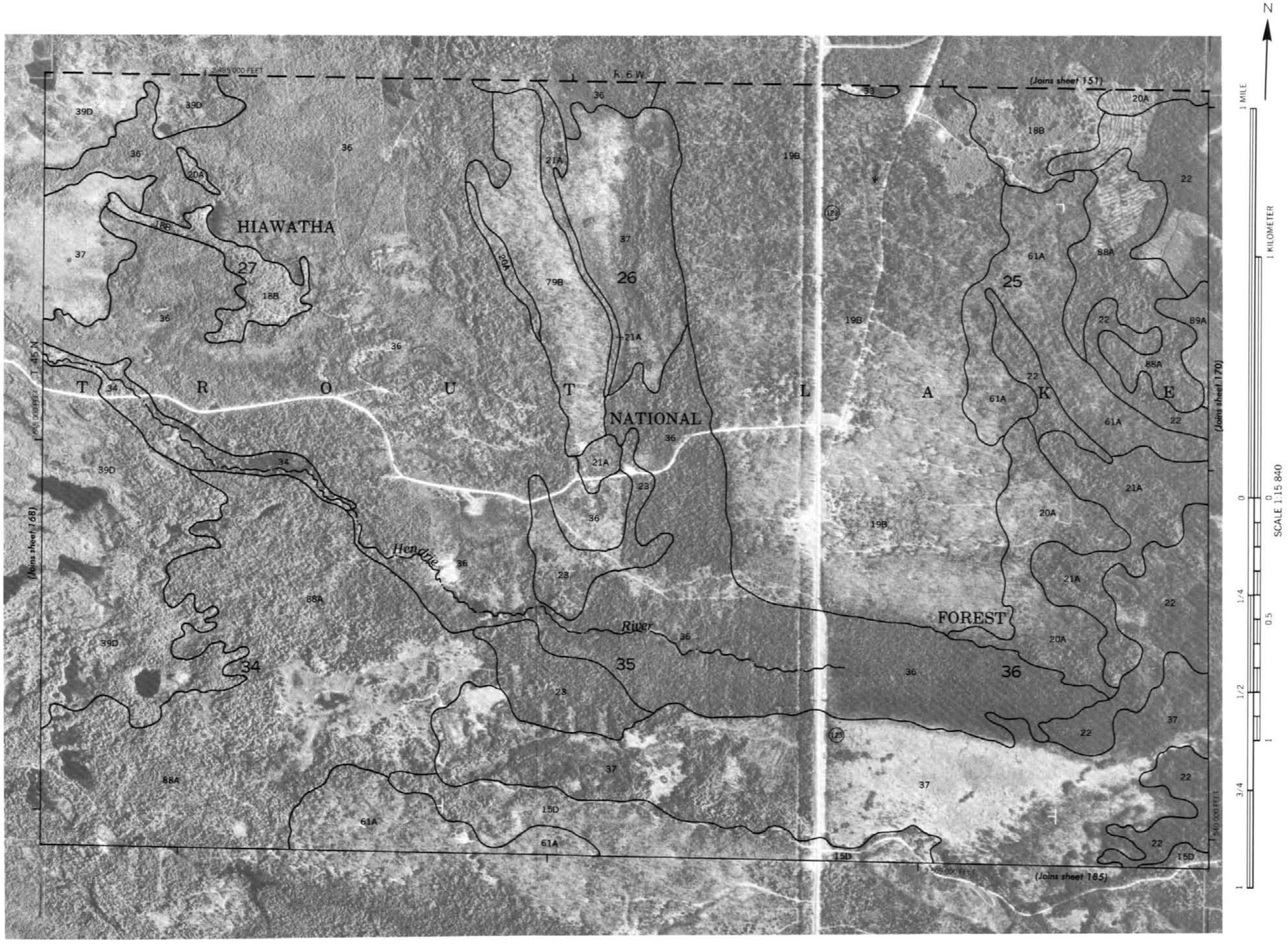

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 150)
(Joins sheet 167)
(Joins sheet 169)
(Joins sheet 184)
R. 6 W.
T. 45 N.
HIAWATHA
NATIONAL
FOREST
T R O U T
L A K E
Naugle
Creek
Hendrie
River
28
29
30
31
32
33
22
91D
39D
36
13B
37
20A
88A
32A
22
36
91E
94A
87B
86A
35
19D
34
18D
21A
52A
18B
86A
87B
94A
91E

CHIPPEWA COUNTY, MICHIGAN NO. 168

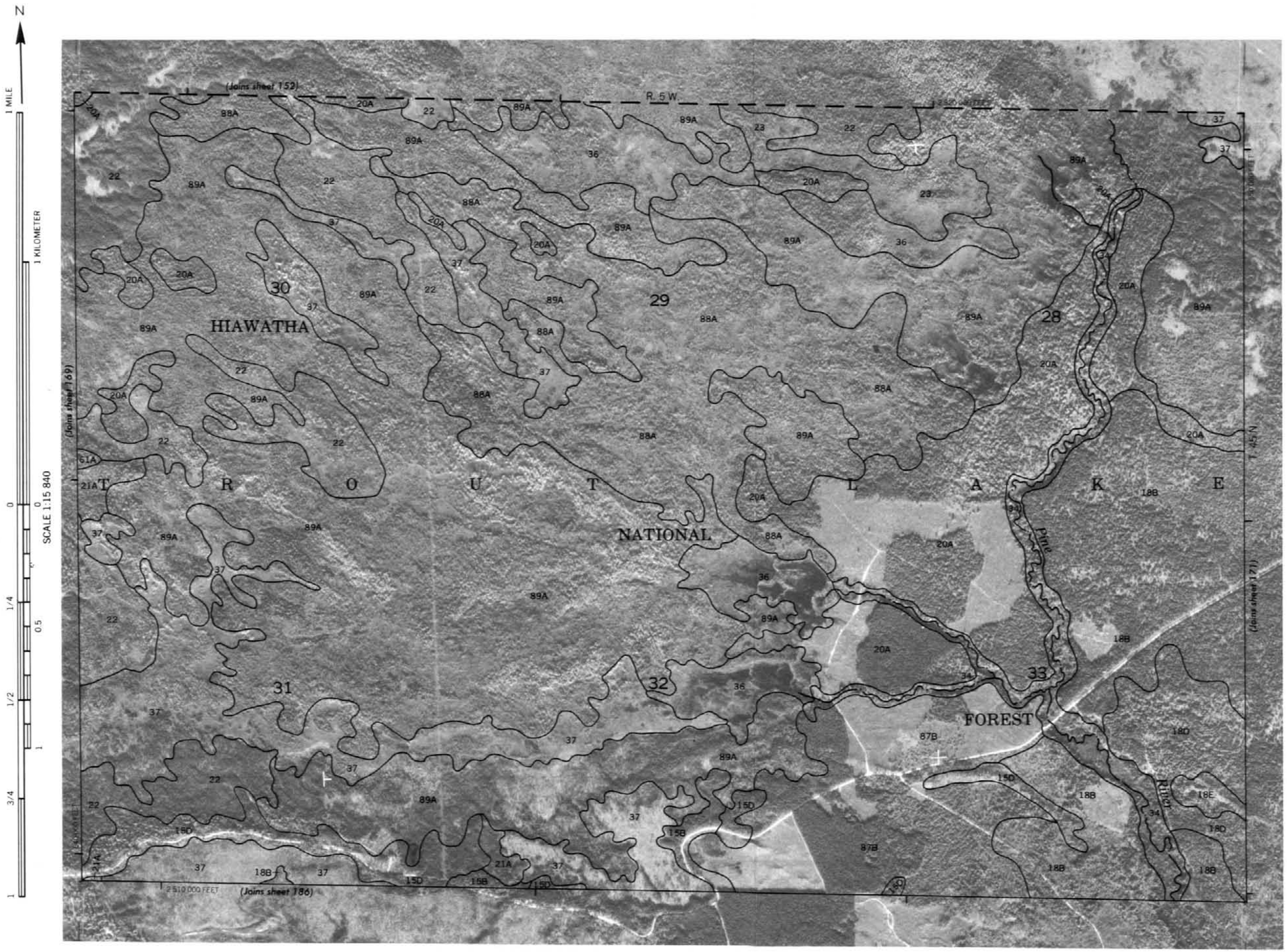
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981- 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 169

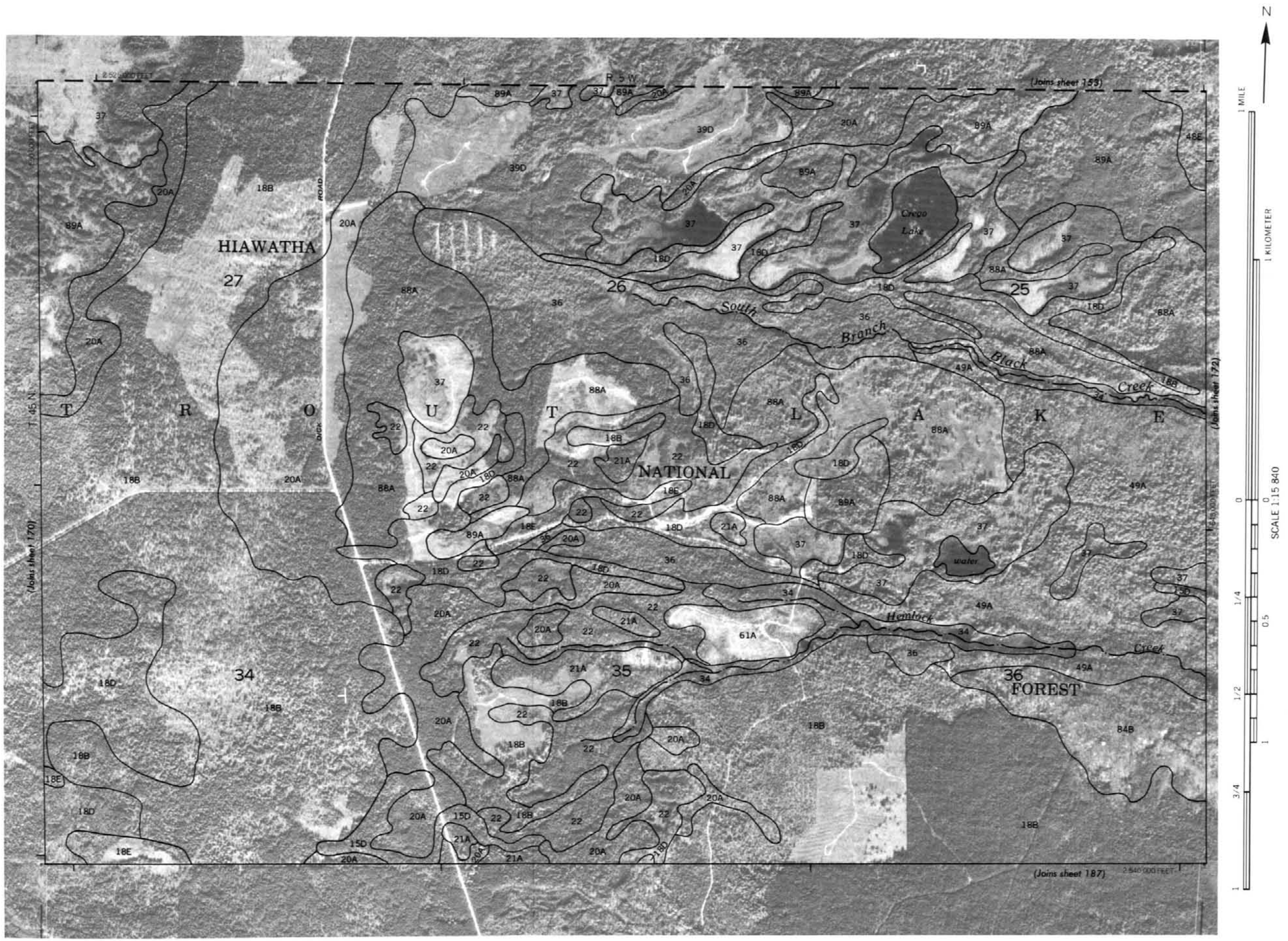

2 495 000 FEET
R. 6 W.
(Joins sheet 151)
(Joins sheet 168)
(Joins sheet 170)
(Joins sheet 185)
T. 45 N.
560 000 FEET
540 000 FEET
2 505 000 FEET
HIAWATHA
TROUT LAKE
NATIONAL
FOREST
Hendrie
River
27
26
25
34
35
36
123
39D
36
20A
18B
37
33
21A
79B
19B
22
61A
88A
89A
23
15D
N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

(170)


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 152)
R. 5 W.
2 550 000 FEET
(Joins sheet 169)
(Joins sheet 171)
T. 45 N.
2 510 000 FEET
(Joins sheet 186)
HIAWATHA
NATIONAL
FOREST
T R O U T L A K E
Pine
River
28
29
30
31
32
33
15B
15D
18B
18D
18E
20A
21A
22
23
34
36
37
61A
87B
88A
89A

CHIPPEWA COUNTY, MICHIGAN NO. 170

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

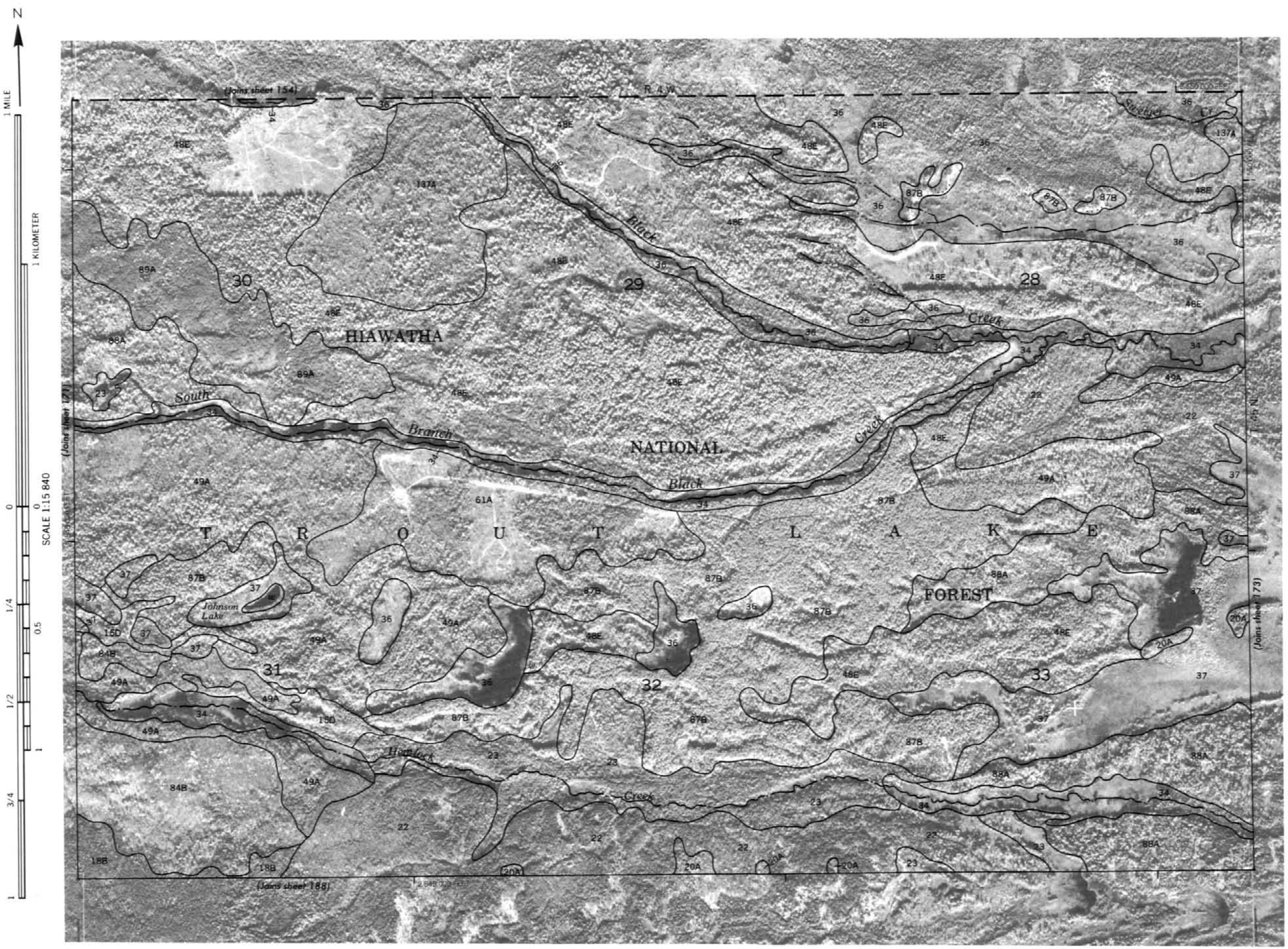

N
R. 5 W.
(Joins sheet 153)
(Joins sheet 170)
(Joins sheet 172)
(Joins sheet 187)
T. 45 N.
2 540 000 FEET
HIAWATHA
NATIONAL
FOREST
T R O U T L A K E
27
26
25
34
35
36
ROAD
Crego Lake
South Branch Black Creek
Hemlock Creek
water
37
89A
20A
18B
39D
88A
36
18D
37
49A
49A
22
20A
21A
18E
61A
34
15D
84B
18B
18D
18E
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 171

(172)

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 172



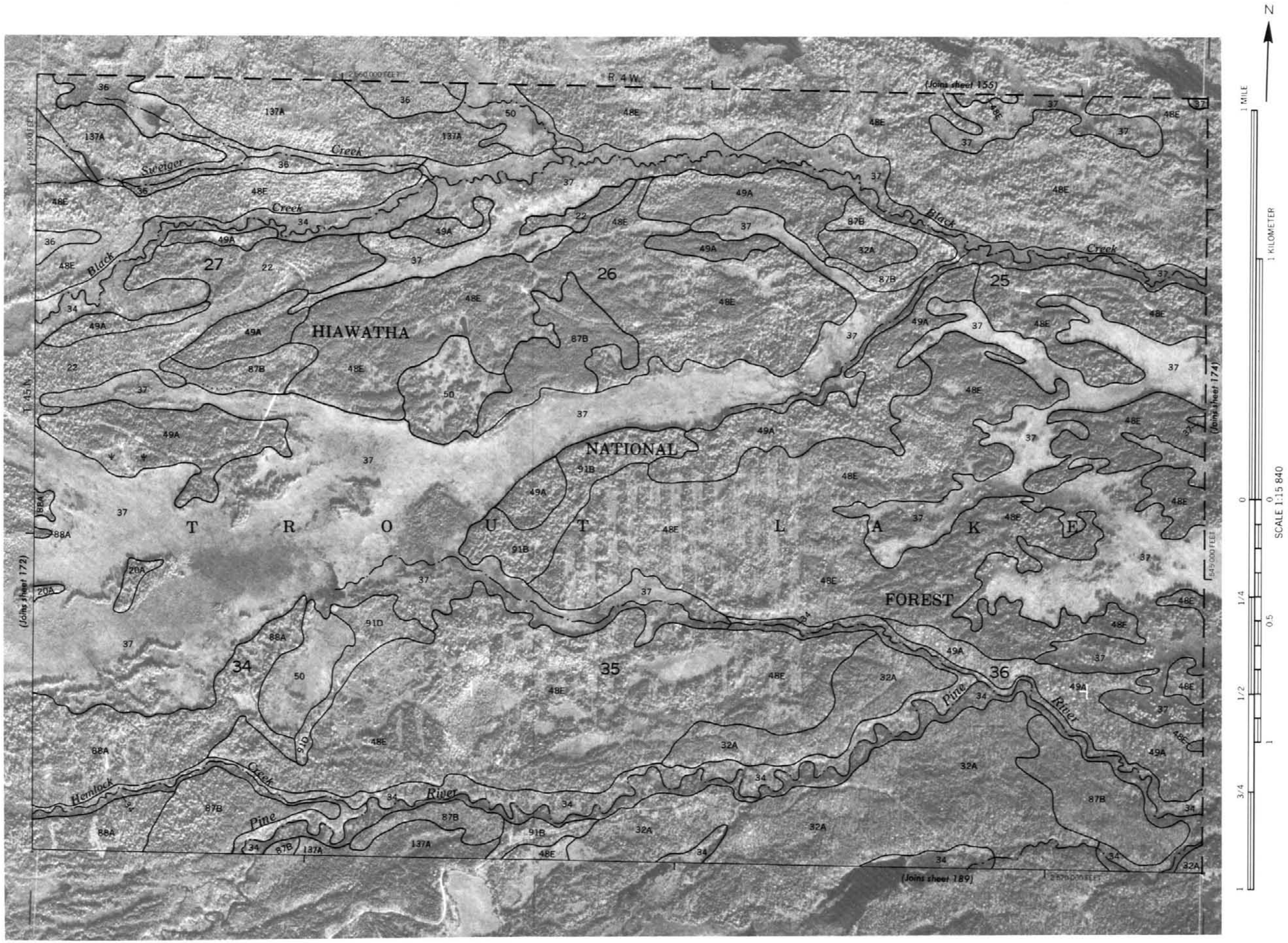
N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 154)
R. 4 W.
(Joins sheet 171)
(Joins sheet 173)
(Joins sheet 188)
HIAWATHA
NATIONAL
T R O U T L A K E
FOREST
South Branch
Black Creek
Black
Creek
Sweeney Cr.
Johnson Lake
Hemlock
Creek
28
29
30
31
32
33
34
36
48E
137A
89A
88A
23
49A
61A
87B
37
15D
84B
22
18B
20A
88E

CHIPPEWA COUNTY, MICHIGAN NO. 172

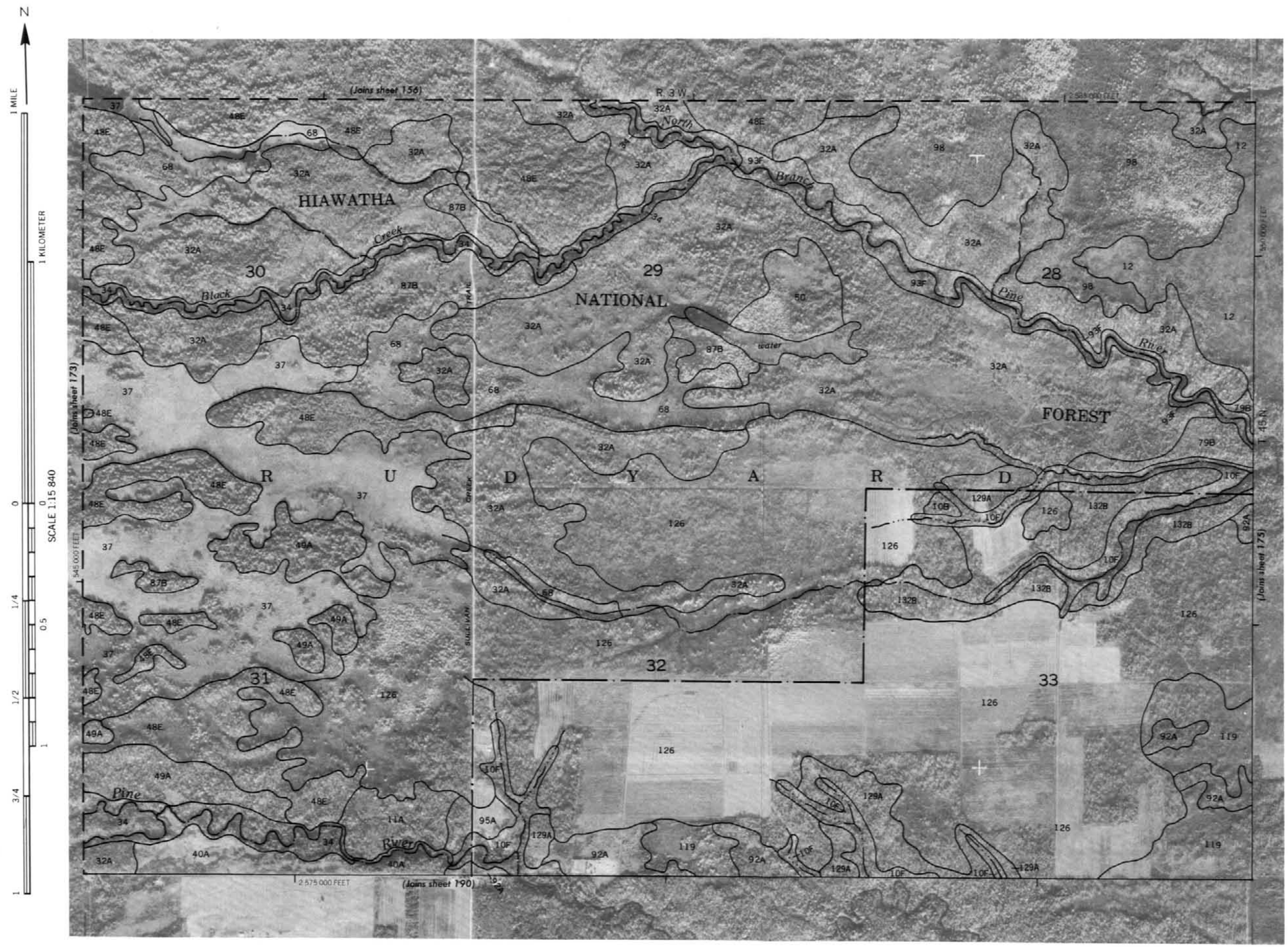
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981, 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 173

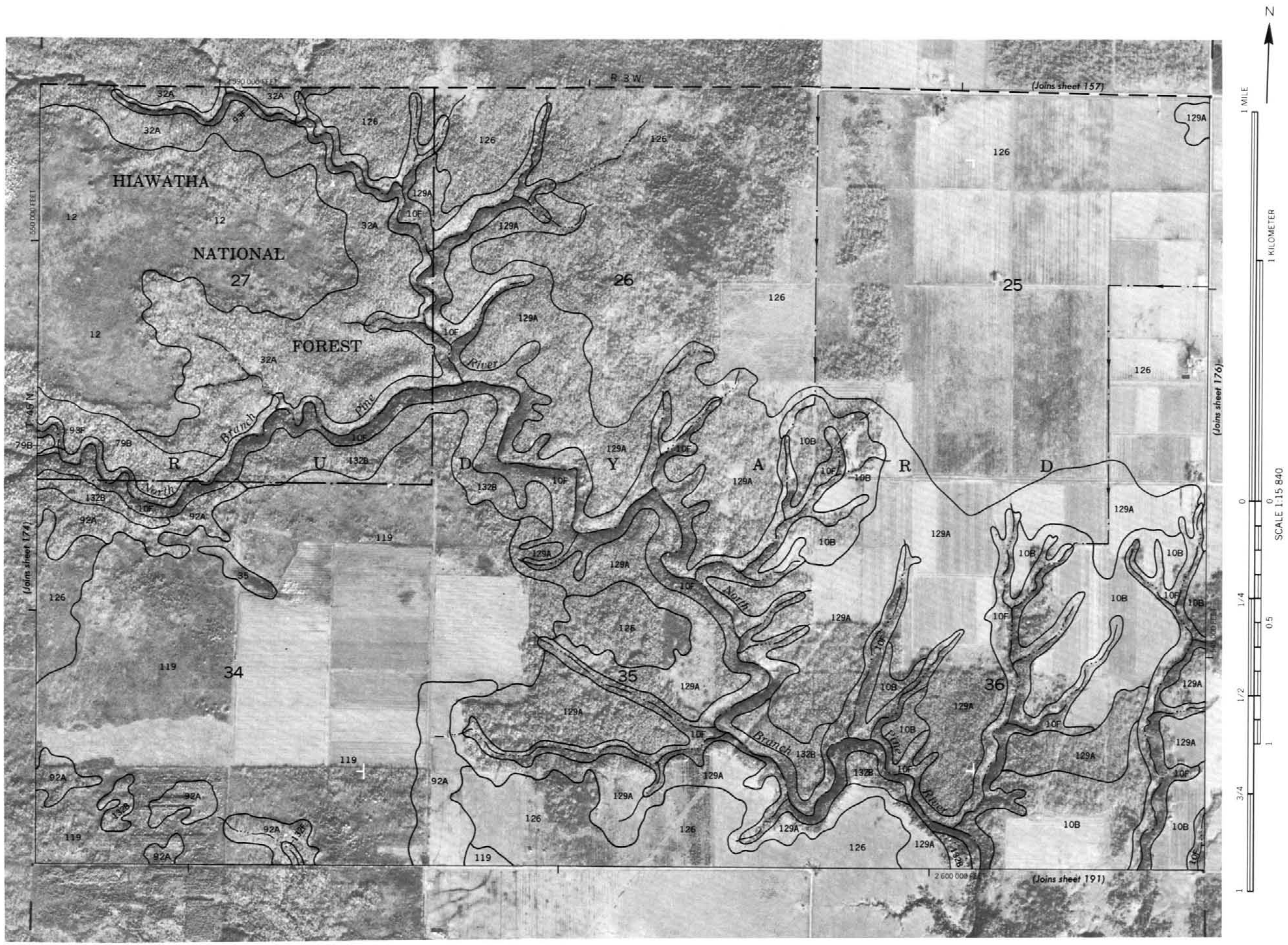

N
(Joins sheet 155)
R. 4 W.
2 560 000 FEET
850 000 FEET
T. 45 N.
(Joins sheet 172)
(Joins sheet 174)
(Joins sheet 189)
549 000 FEET
2 570 000 FEET
HIAWATHA
NATIONAL
FOREST
T R O U T L A K E
27
26
25
34
35
36
Sweiger Creek
Black Creek
Hemlock Creek
Pine River
36
137A
50
48E
37
22
49A
34
87B
32A
50
91B
91D
88A
20A
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 174


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
(Joins sheet 156)
(Joins sheet 173)
(Joins sheet 175)
(Joins sheet 190)
R. 3 W.
T. 45 N.
2 585 000 FEET
550 000 FEET
545 000 FEET
2 575 000 FEET
HIAWATHA
NATIONAL
FOREST
R U D Y A R D
30
29
28
31
32
33
Black
Creek
North
Branch
Pine
River
water
SULLIVAN
CREEK
TRAIL
37
48E
32A
68
87B
34
93F
98
12
50
79B
10F
10B
129A
126
132B
92A
49A
40A
11A
95A
119

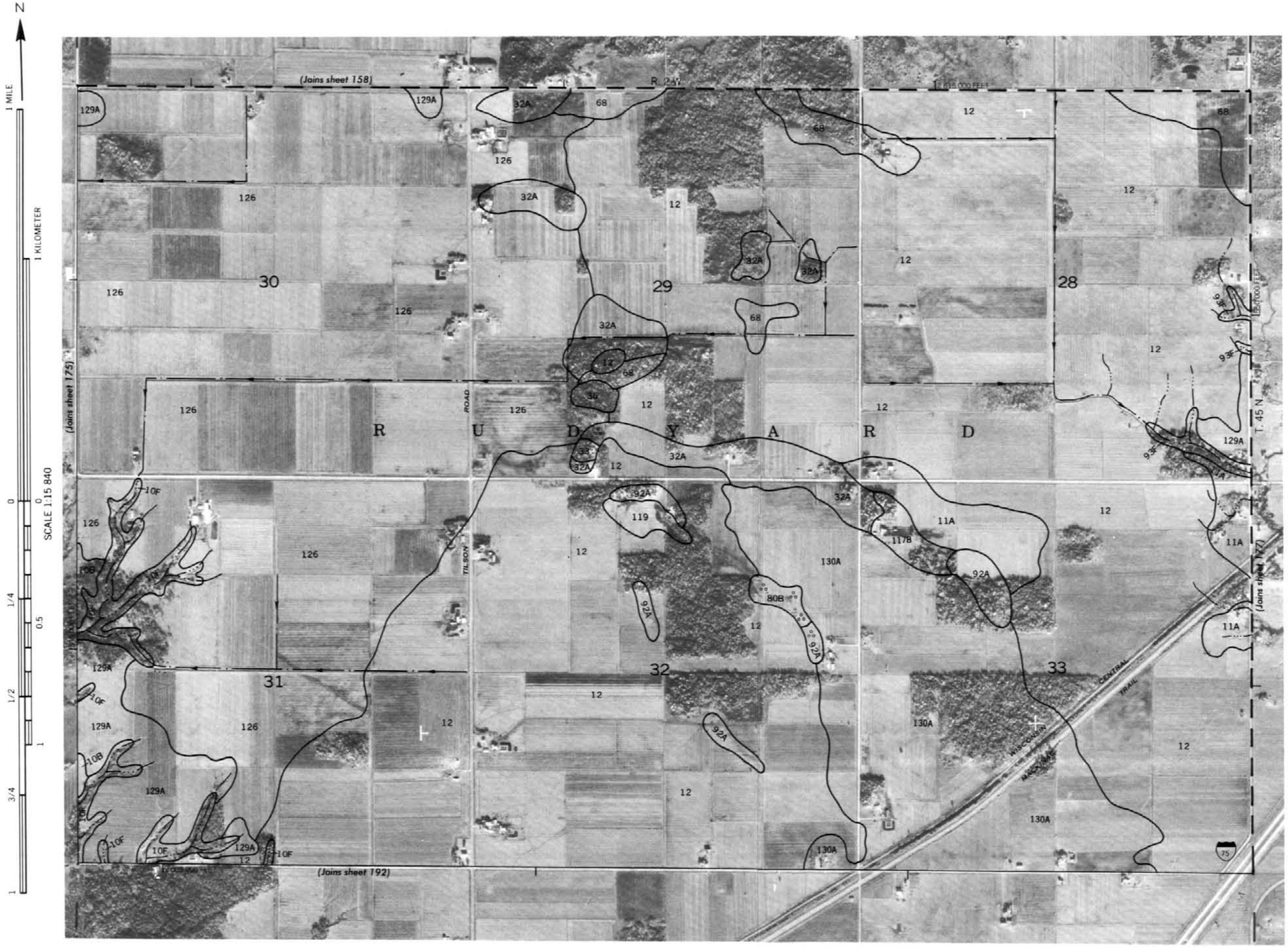
CHIPPEWA COUNTY, MICHIGAN NO. 174

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981- 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


175
N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
R. 3 W.
T. 46 N.
2 590 000 FEET
2 600 000 FEET
350 000 FEET
(Joins sheet 157)
(Joins sheet 176)
(Joins sheet 191)
(Joins sheet 174)
HIAWATHA
NATIONAL
FOREST
R U D Y A R D
27
26
25
34
35
36
North Branch Pine River
12
32A
126
129A
10F
10B
79B
93F
132B
92A
119
35

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

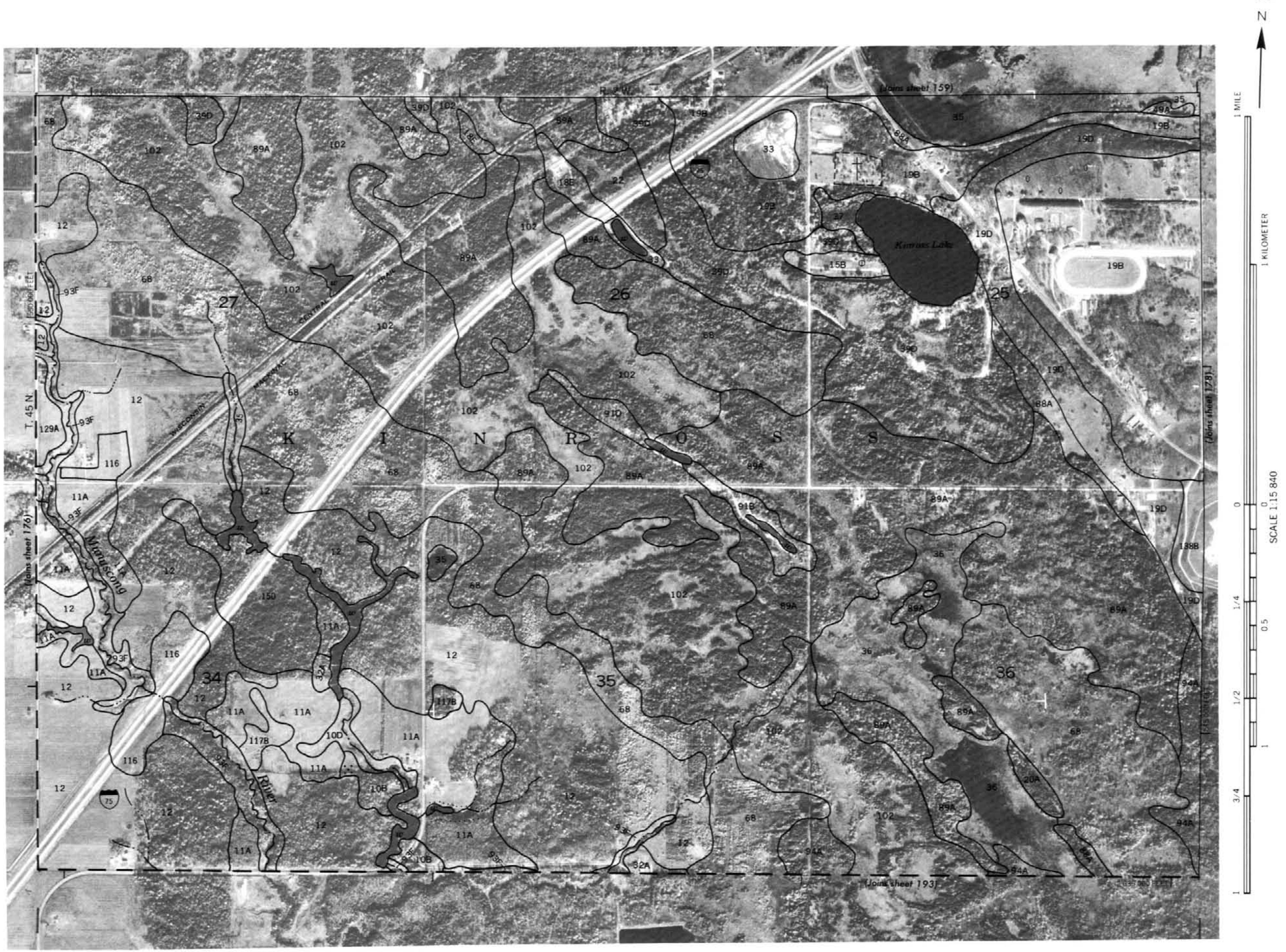
CHIPPEWA COUNTY, MICHIGAN NO. 175


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 158)
(Joins sheet 175)
(Joins sheet 177)
(Joins sheet 192)
R. 2 W.
T. 45 N.
R U D Y A R D
TILSON ROAD
WISCONSIN CENTRAL
MACKINAC TRAIL
75
30
29
28
31
32
33
12
126
129A
32A
68
36
33
119
92A
80B
130A
11A
117B
93F
10F
10B

CHIPPEWA COUNTY, MICHIGAN NO. 176

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

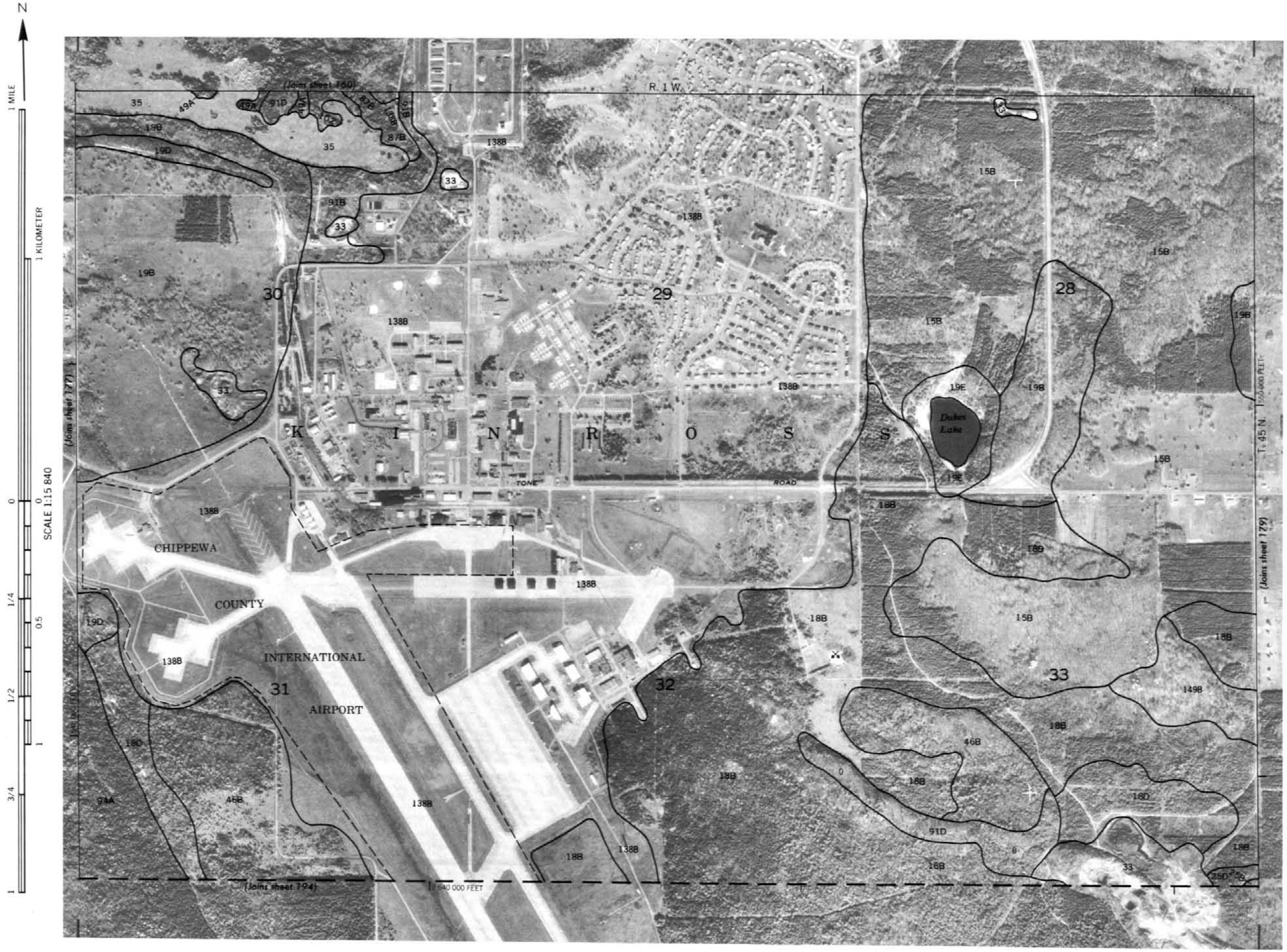
SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 177


177
N
(Joins sheet 159)
(Joins sheet 176)
(Joins sheet 178)
(Joins sheet 193)
R. 2 W.
T. 45 N.
K I N R O S S
Kinross Lake
Munuscong River
Wisconsin Central Railroad
75
27
26
25
34
35
36
102
89A
39D
68
12
19B
19D
22
18B
33
27
15B
93F
129A
116
11A
150
117B
10D
10B
32A
94A
91B
20A
138B
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 177

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 178

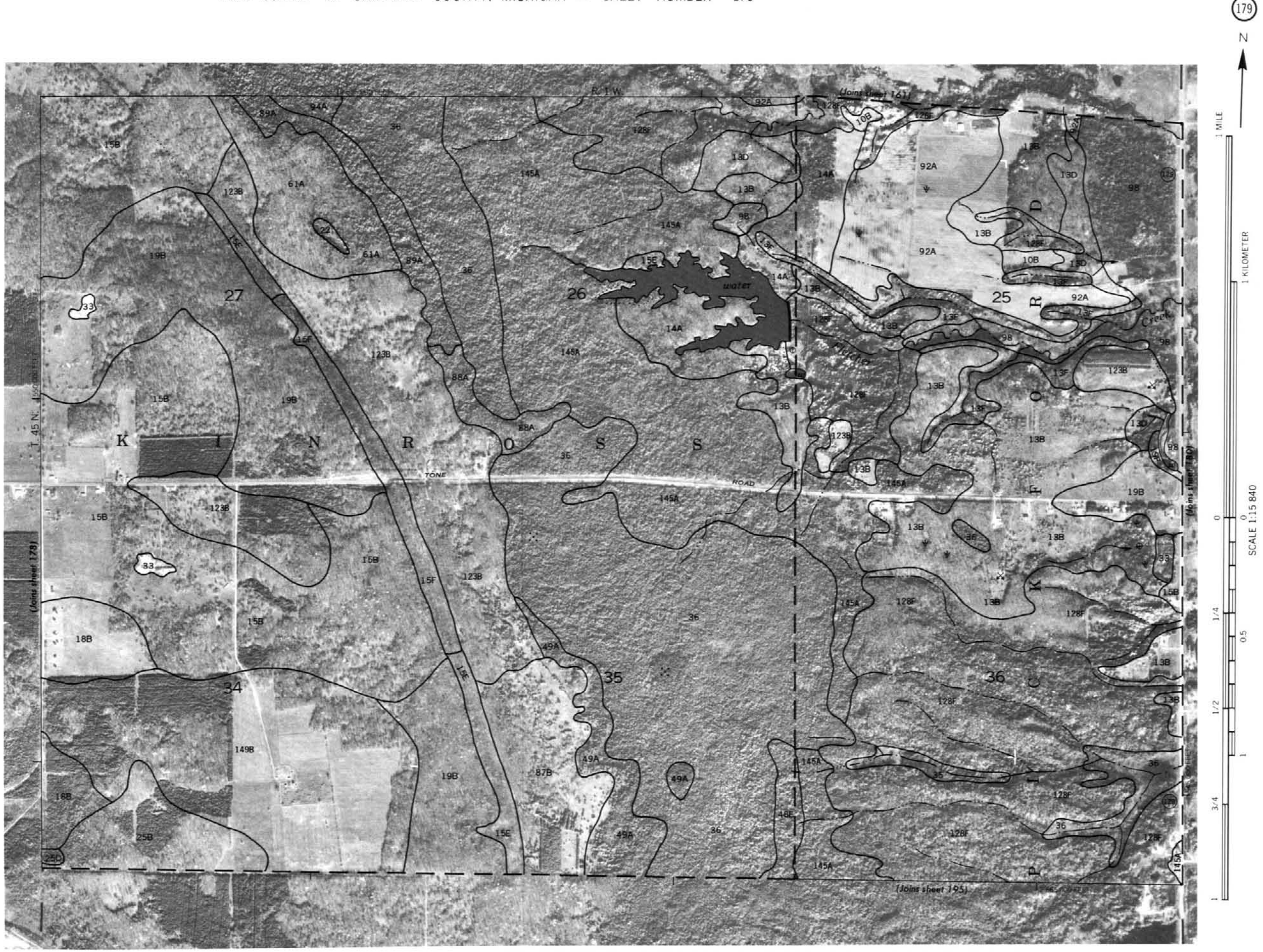

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
R. 1 W.
T. 45 N.
(Joins sheet 160)
(Joins sheet 177)
(Joins sheet 179)
(Joins sheet 194)
1 640 000 FEET
550 000 FEET
KINROSS
TONE ROAD
CHIPPEWA COUNTY INTERNATIONAL AIRPORT
Dukes Lake
28
29
30
31
32
33
35
49A
19B
19D
91D
87B
91B
33
138B
15B
19E
18B
149B
46B
18D
91D
94A
25D
25B

CHIPPEWA COUNTY, MICHIGAN NO. 178

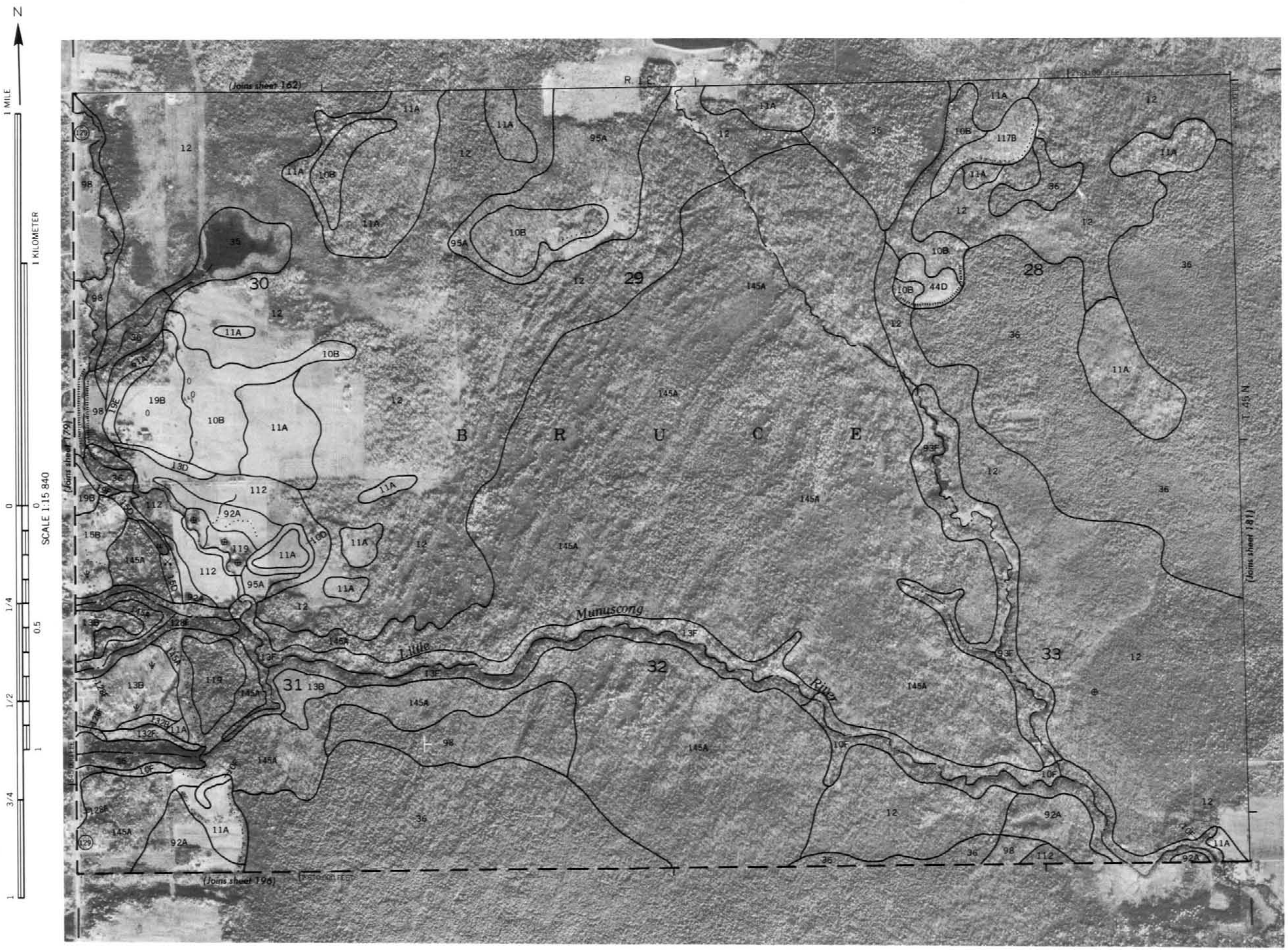
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 179


179
N
R. 1 W.
T. 45 N.
(Joins sheet 161)
(Joins sheet 178)
(Joins sheet 180)
(Joins sheet 195)
K I N R O S S
D R O P P E R
26
27
25
34
35
36
water
TONE ROAD
Pine River
Creek
15B
19B
123B
61A
89A
94A
36
145A
128F
13D
13B
9B
14A
92A
10B
13F
15E
15F
88A
3E
33
18B
149B
25B
25D
87B
49A
46E
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 180

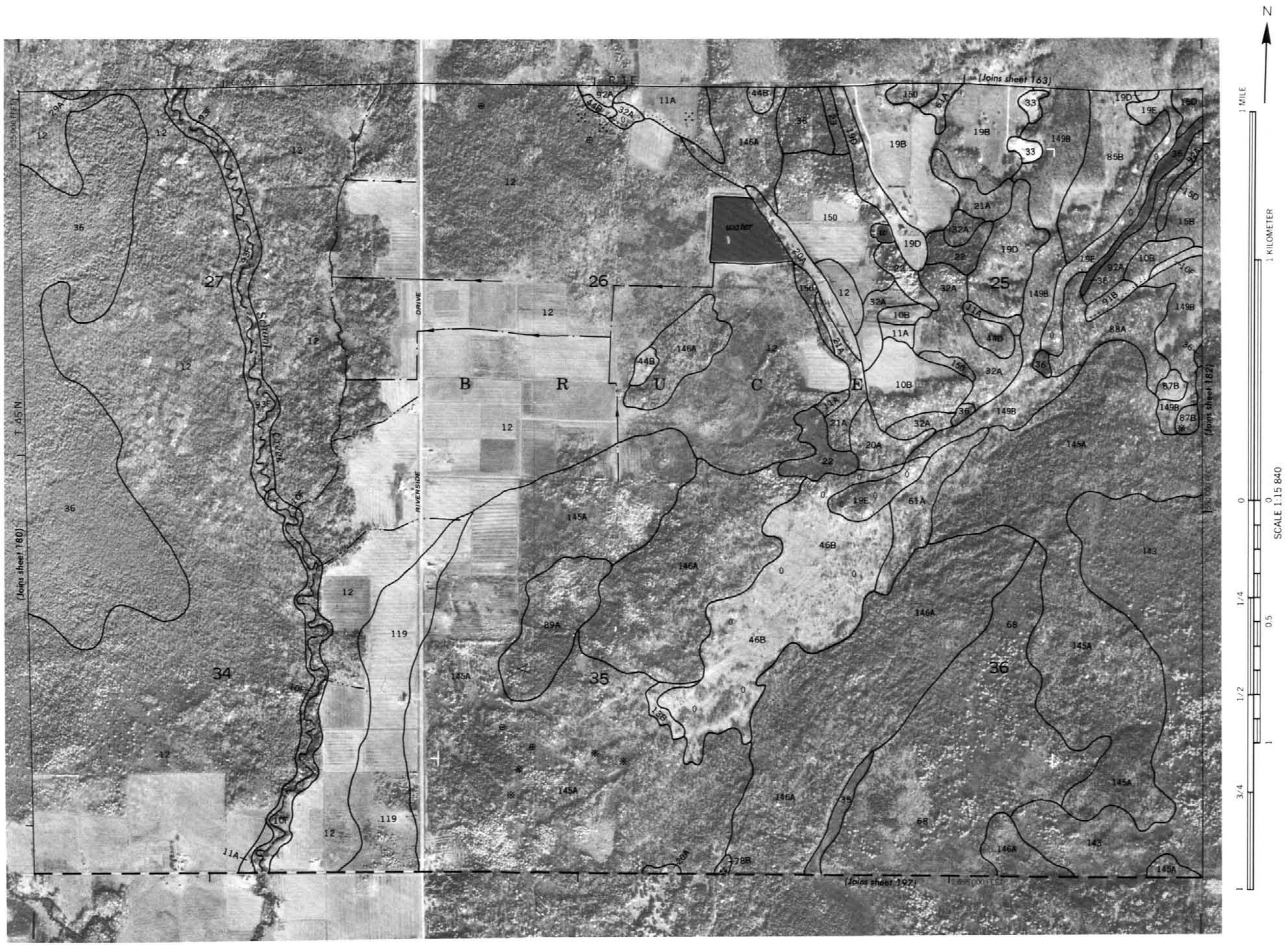

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 162)
R. 1 E.
(Joins sheet 179)
(Joins sheet 181)
(Joins sheet 196)
T. 45 N.
B R U C E
28
29
30
31
32
33
Little Munuscong River
12
11A
10B
95A
35
36
98
117B
44D
145A
19B
13D
112
92A
119
93F
13F
13B
128F
132F
10F
15B
11A
12
36
92A
112

CHIPPEWA COUNTY, MICHIGAN NO. 180

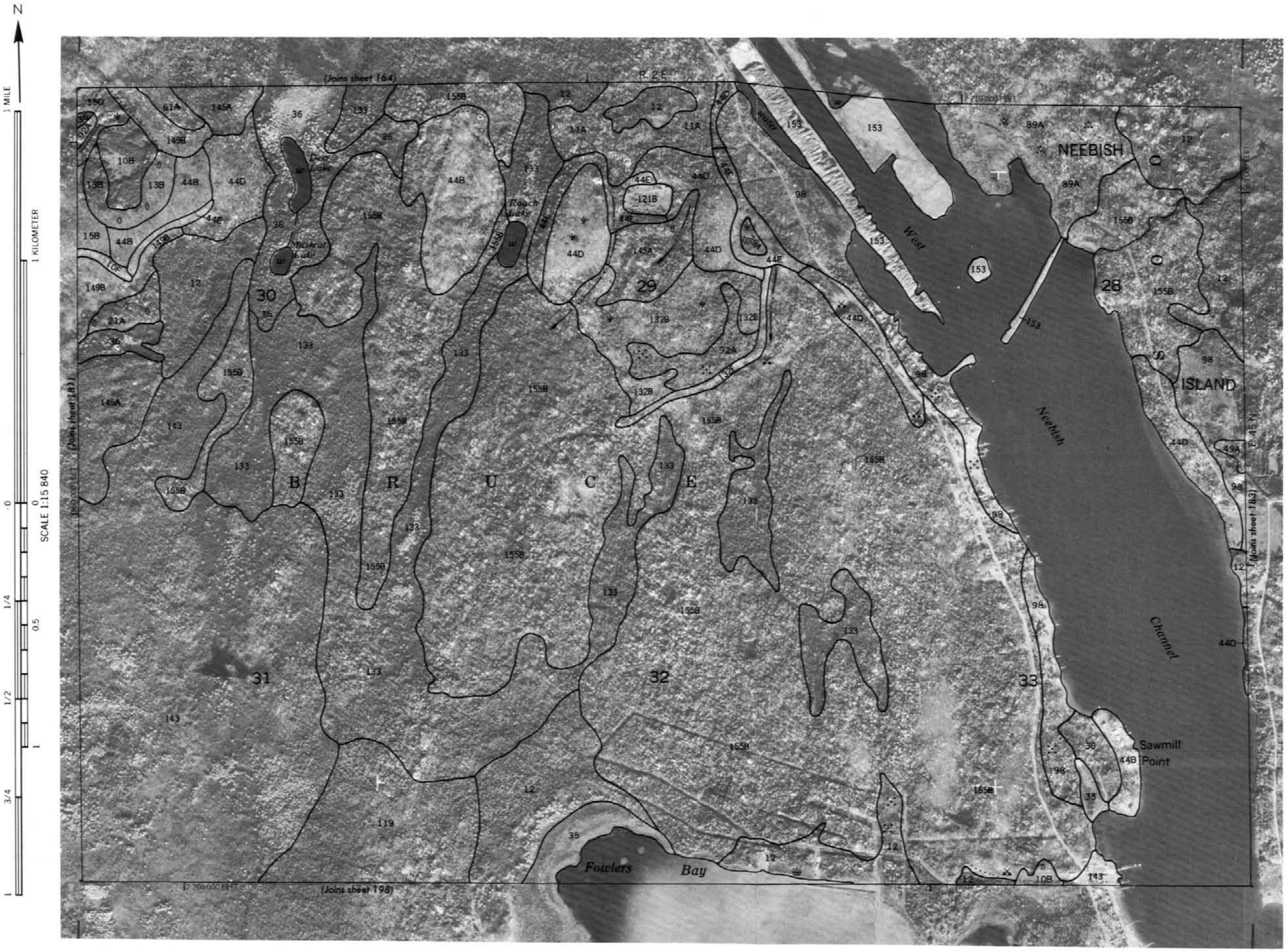
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 181

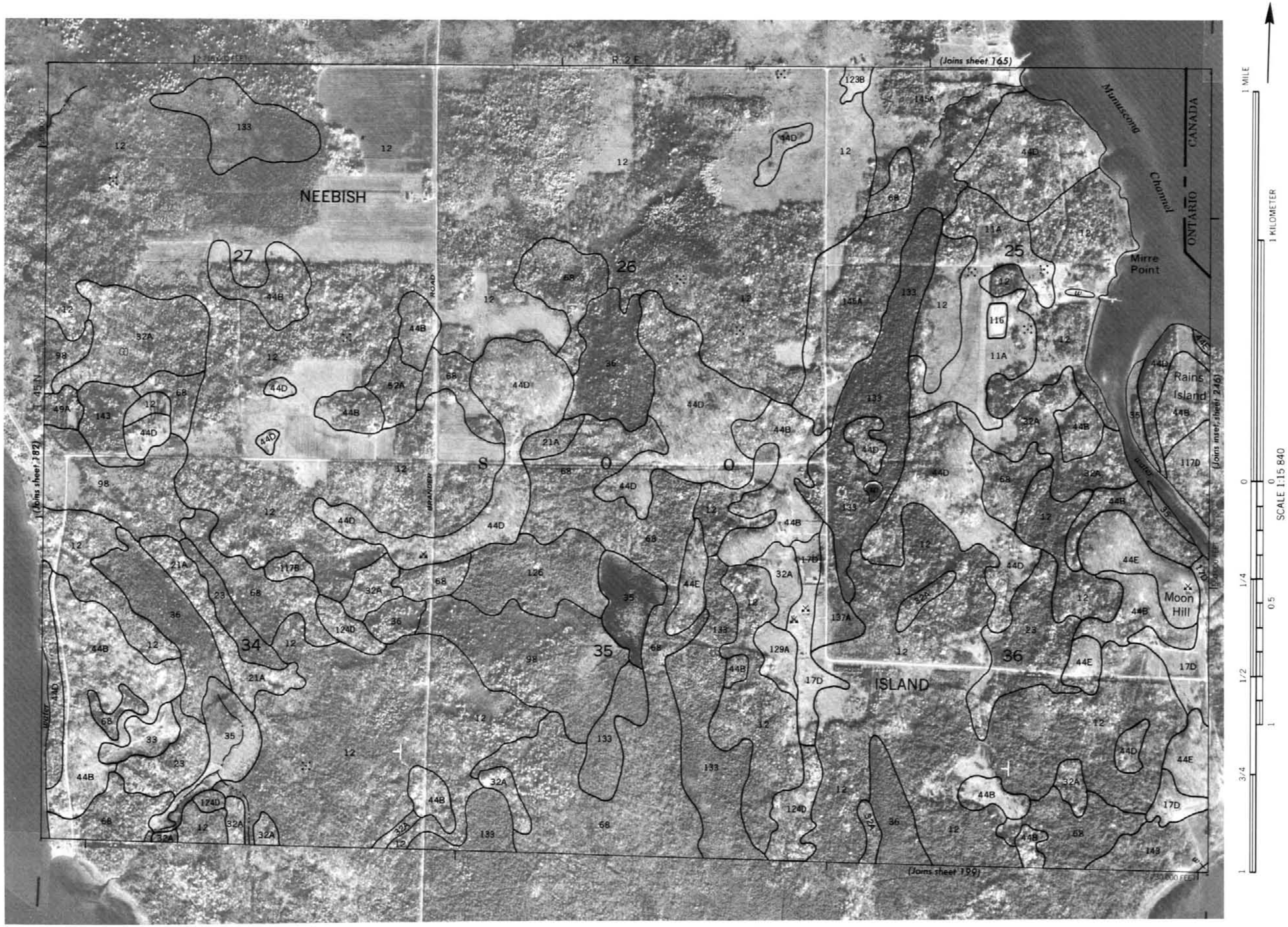

N
(Joins sheet 163)
(Joins sheet 180)
(Joins sheet 182)
(Joins sheet 197)
R 1 E
T 45 N
Schoon Creek
RIVERSIDE DRIVE
BRUCE
water
27
26
25
34
35
36
12
36
29A
93E
10F
11A
119
145A
146A
89A
46B
13B
68
143
35
20A
78B
44B
92A
32A
14B
11A
146A
44B
36
23
19D
19B
19E
150
61A
33
149B
85B
15D
15B
10B
10F
91B
88A
87B
21A
20A
22
32A
10B
11A
44D
19E
61A
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 182


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 164)
(Joins sheet 181)
(Joins sheet 183)
(Joins sheet 198)
R 2 E
R 3 E
T 45 N
NEEBISH
ISLAND
West
Neebish
Channel
Sawmill Point
Fowlers Bay
Deer Lake
Roach Lake
Muskrat Lake
B R U C E
28
29
30
31
32
33
10B
12
13B
15B
21A
35
36
44B
44D
44E
61A
89A
98
119
121B
132B
133
143
145A
149B
153
155B

CHIPPEWA COUNTY, MICHIGAN NO. 182

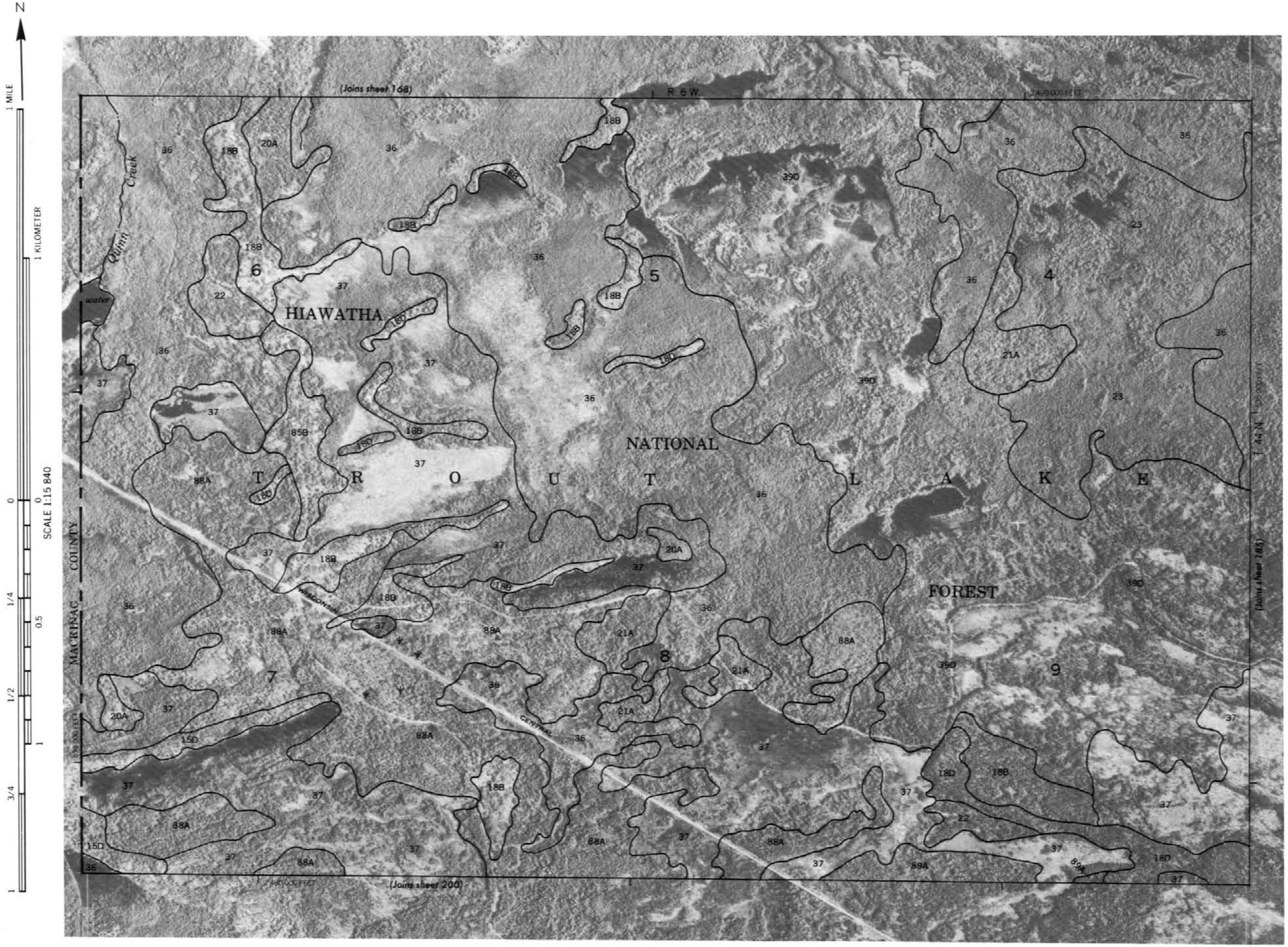
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
(Joins sheet 165)
(Joins sheet 182)
(Joins sheet 199)
(Joins inset sheet 246)
R. 2 E.
T. 45 N.
NEEBISH
S
O
O
ISLAND
BRANDER ROAD
Munuscong
Channel
CANADA
ONTARIO
Mirre Point
Rains Island
Moon Hill
Water
27
26
25
34
35
36
12
133
44D
44B
44E
32A
68
98
143
49A
21A
23
36
35
33
117B
117D
124D
126
129A
137A
145A
123B
11A
116
17D
52A
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 183

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 184


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 168)
R. 6 W.
2 490 000 FEET
(Joins sheet 185)
T. 44 N.
(Joins sheet 200)
Quinn Creek
water
MACKINAC COUNTY
HIAWATHA
NATIONAL
FOREST
T R O U T L A K E
WISCONSIN CENTRAL
4
5
6
7
8
9
36
18B
20A
22
37
18D
39D
23
21A
85B
88A
89A
20A
15D
36
37
88A
18B
39D

CHIPPEWA COUNTY, MICHIGAN NO. 184

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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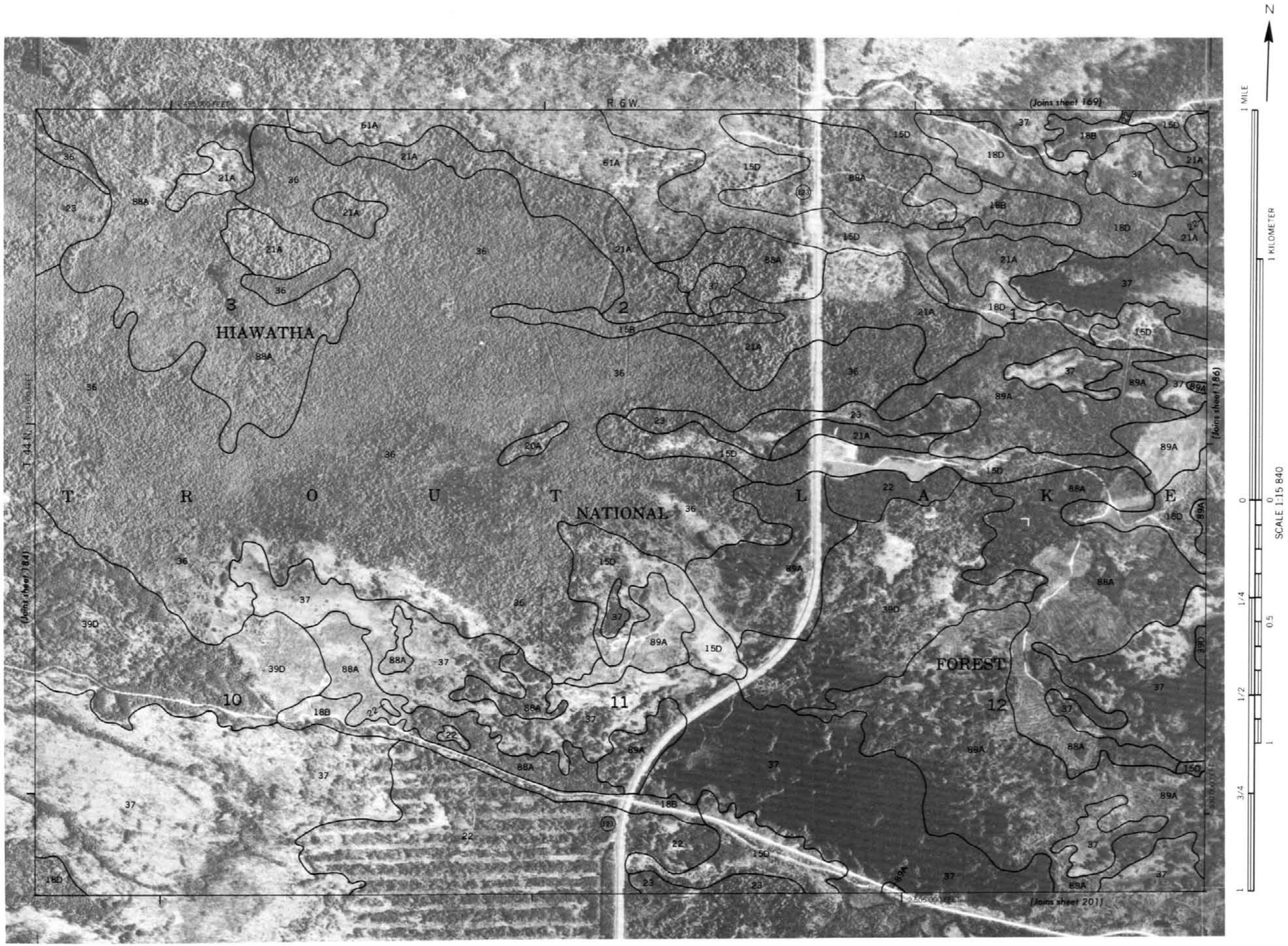
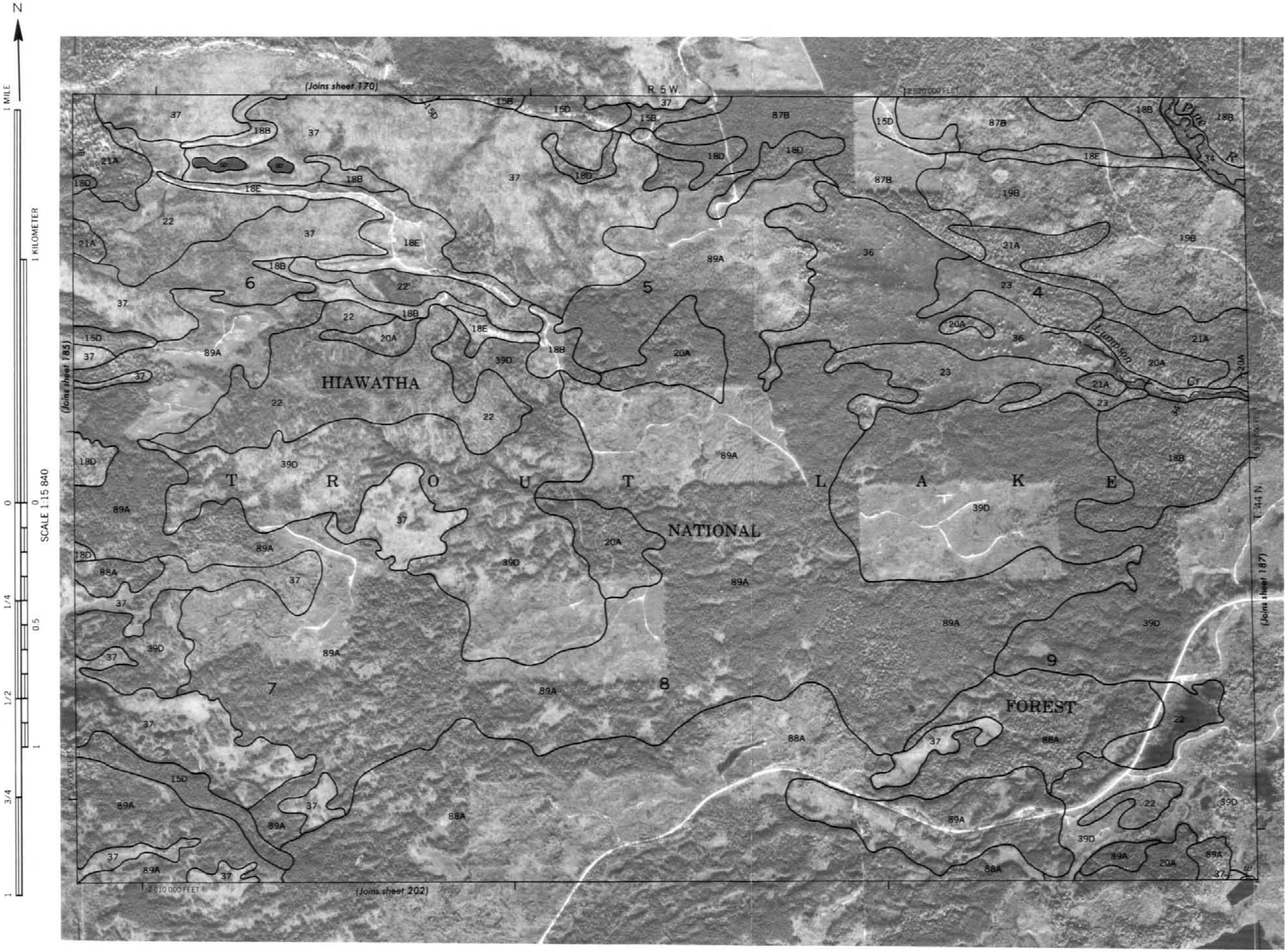
CHIPPEWA COUNTY, MICHIGAN NO. 185


N
2 485 000 FEET
R. 6 W.
(Joins sheet 169)
T. 44 N.
(Joins sheet 184)
(Joins sheet 186)
(Joins sheet 201)
2 505 000 FEET
HIAWATHA
NATIONAL
FOREST
T R O U T L A K E
1
2
3
10
11
12
123
36
23
88A
21A
61A
15D
15B
18D
18B
37
89A
22
20A
39D
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

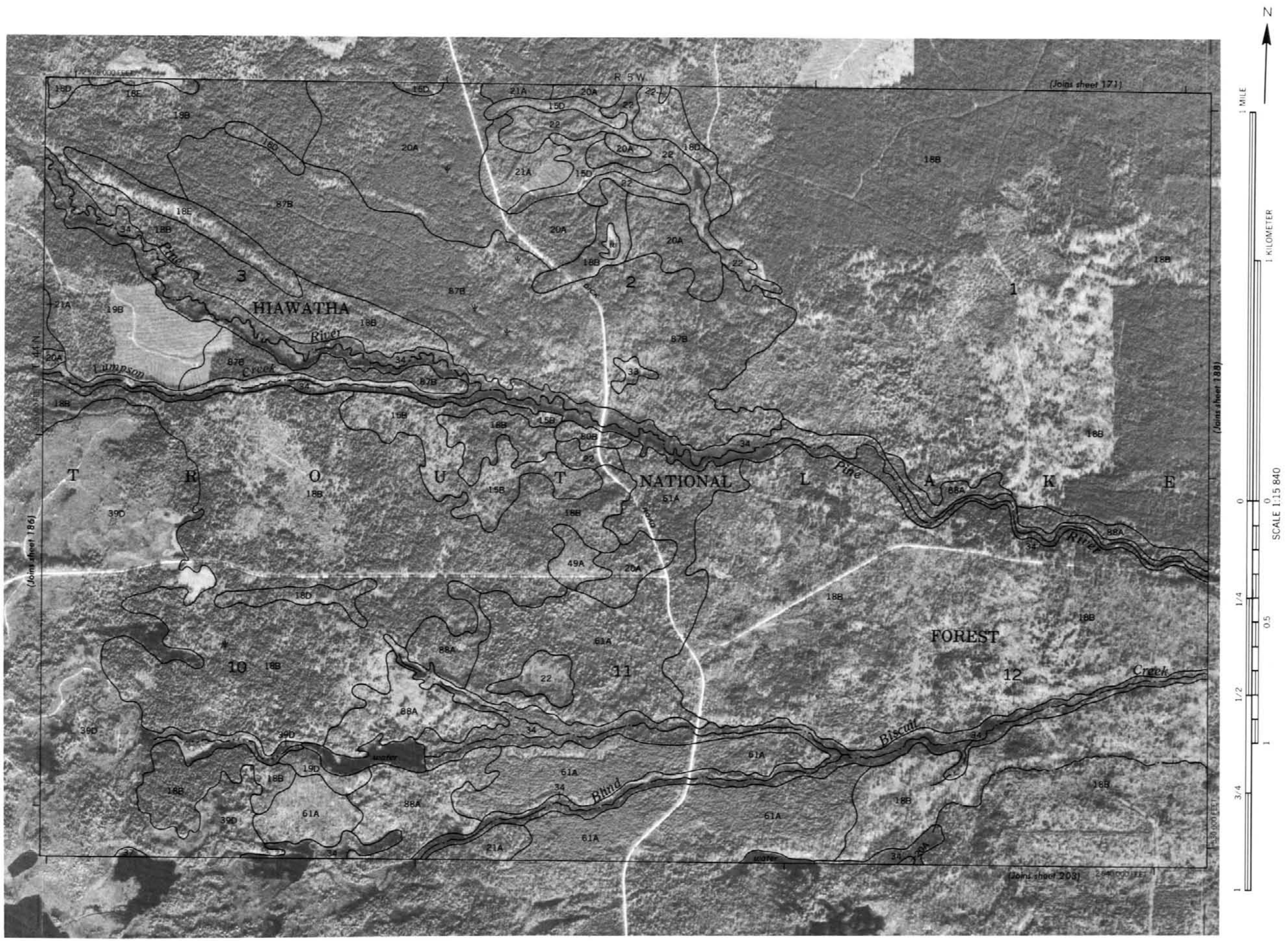
186

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 186


N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
SCALE 1:15 840
(Joins sheet 170)
R 5 W.
2 520 000 FEET
(Joins sheet 185)
(Joins sheet 187)
(Joins sheet 202)
2 510 000 FEET
T 44 N.
HIAWATHA
T R O U T
L A K E
NATIONAL
FOREST
Pine R
Lumpson Cr
6
5
4
7
8
9
37
18B
21A
18D
18E
22
15D
15B
87B
19B
36
23
20A
39D
89A
88A
34
w

CHIPPEWA COUNTY, MICHIGAN NO. 186

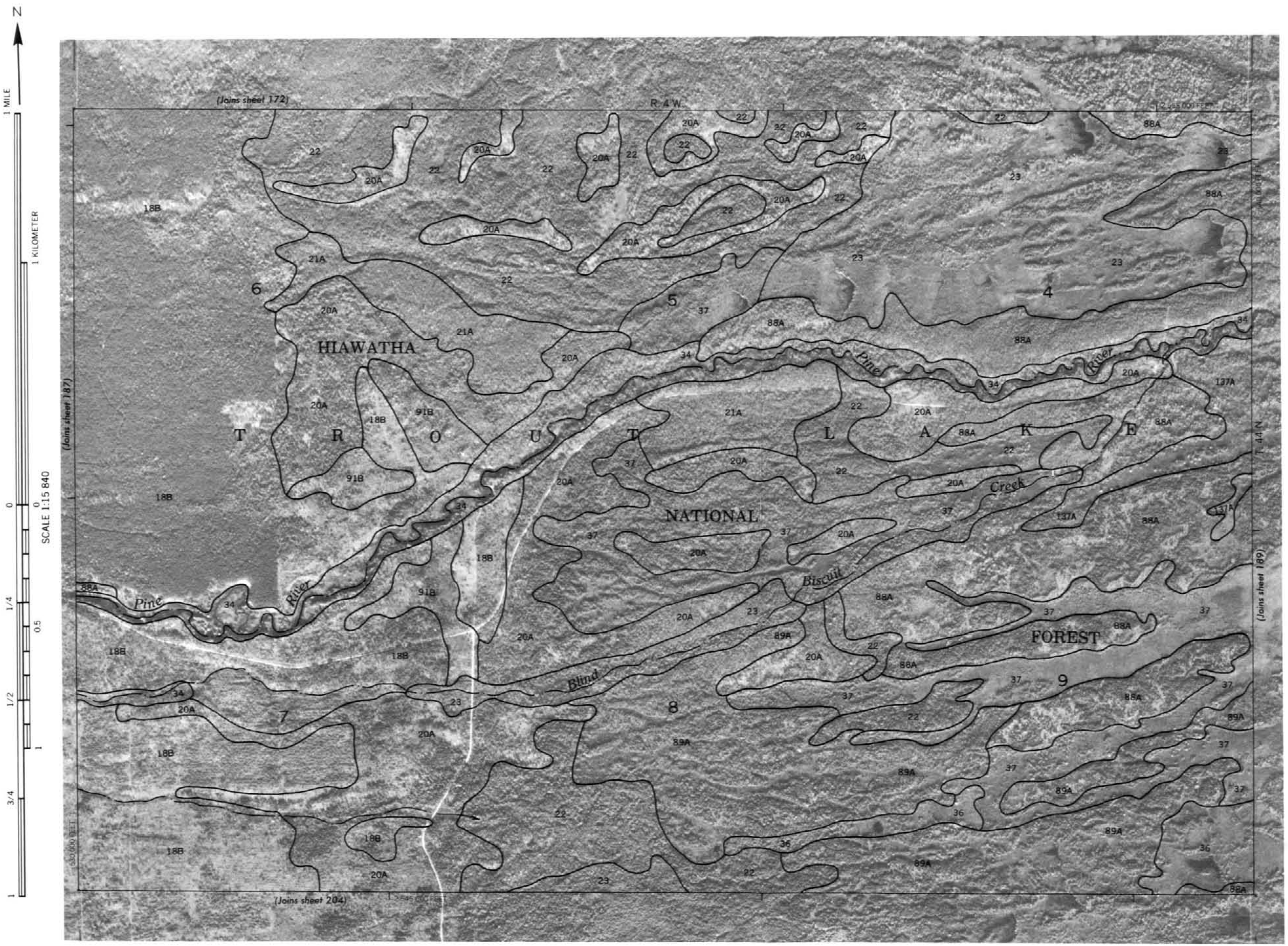
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
R 5 W
T 44 N
(Joins sheet 171)
(Joins sheet 188)
(Joins sheet 186)
(Joins sheet 203)
HIAWATHA
NATIONAL
FOREST
T R O U T
L A K E
Pine River
Lampson Creek
Biscuit Creek
Blind
Creek
1
2
3
10
11
12
18B
18D
18E
19B
19D
20A
21A
22
15B
15D
34
33
39D
49A
61A
80B
87B
88A
water
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from **1981 - 1983** aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 187

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 188

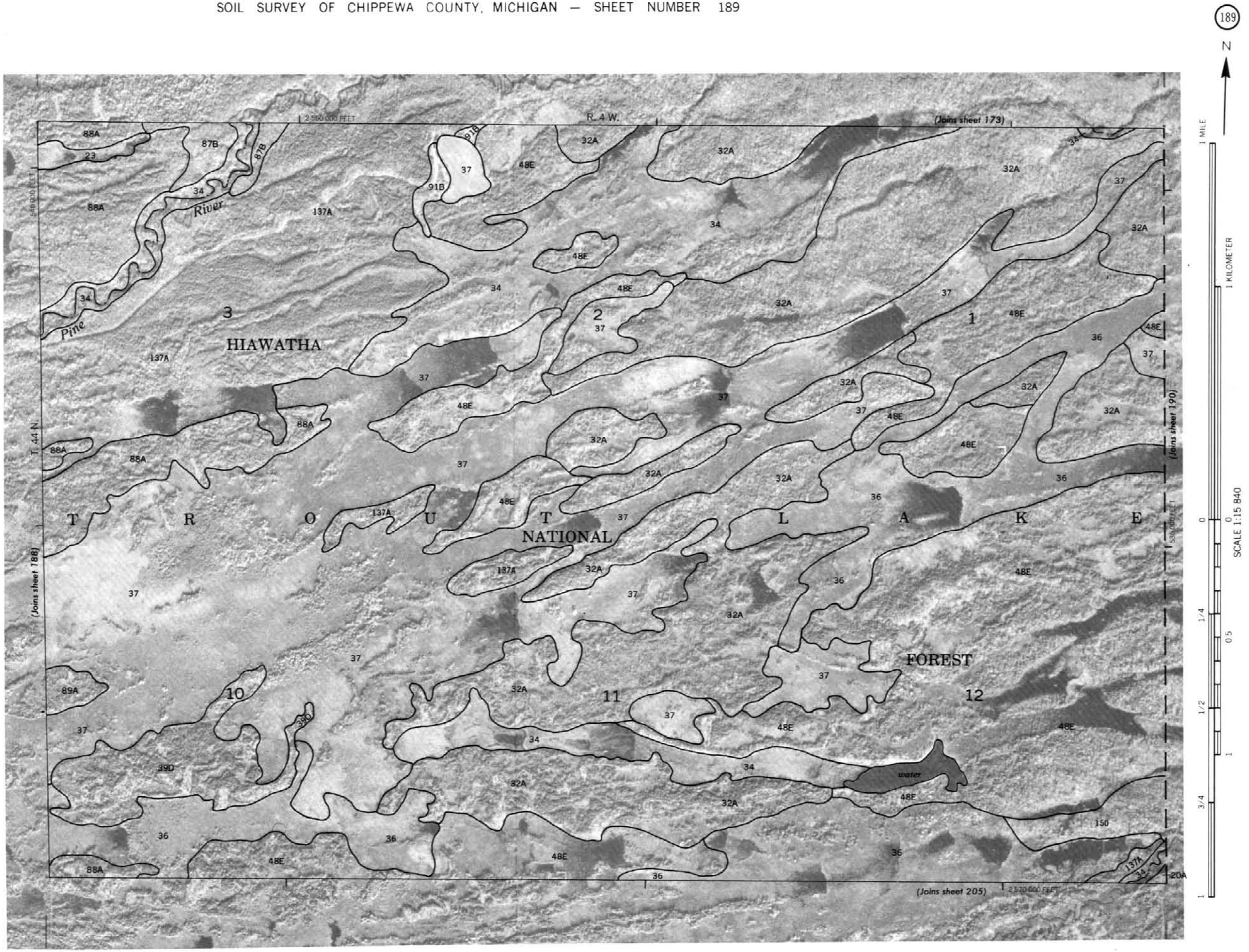

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 172)
R. 4 W.
(Joins sheet 187)
(Joins sheet 189)
(Joins sheet 204)
T. 44 N.
HIAWATHA
NATIONAL
FOREST
T R O U T L A K E
Pine River
Pine River
Biscuit Creek
Blind Creek
4
5
6
7
8
9
18B
20A
21A
22
23
34
36
37
88A
89A
91B
137A

CHIPPEWA COUNTY, MICHIGAN NO. 188

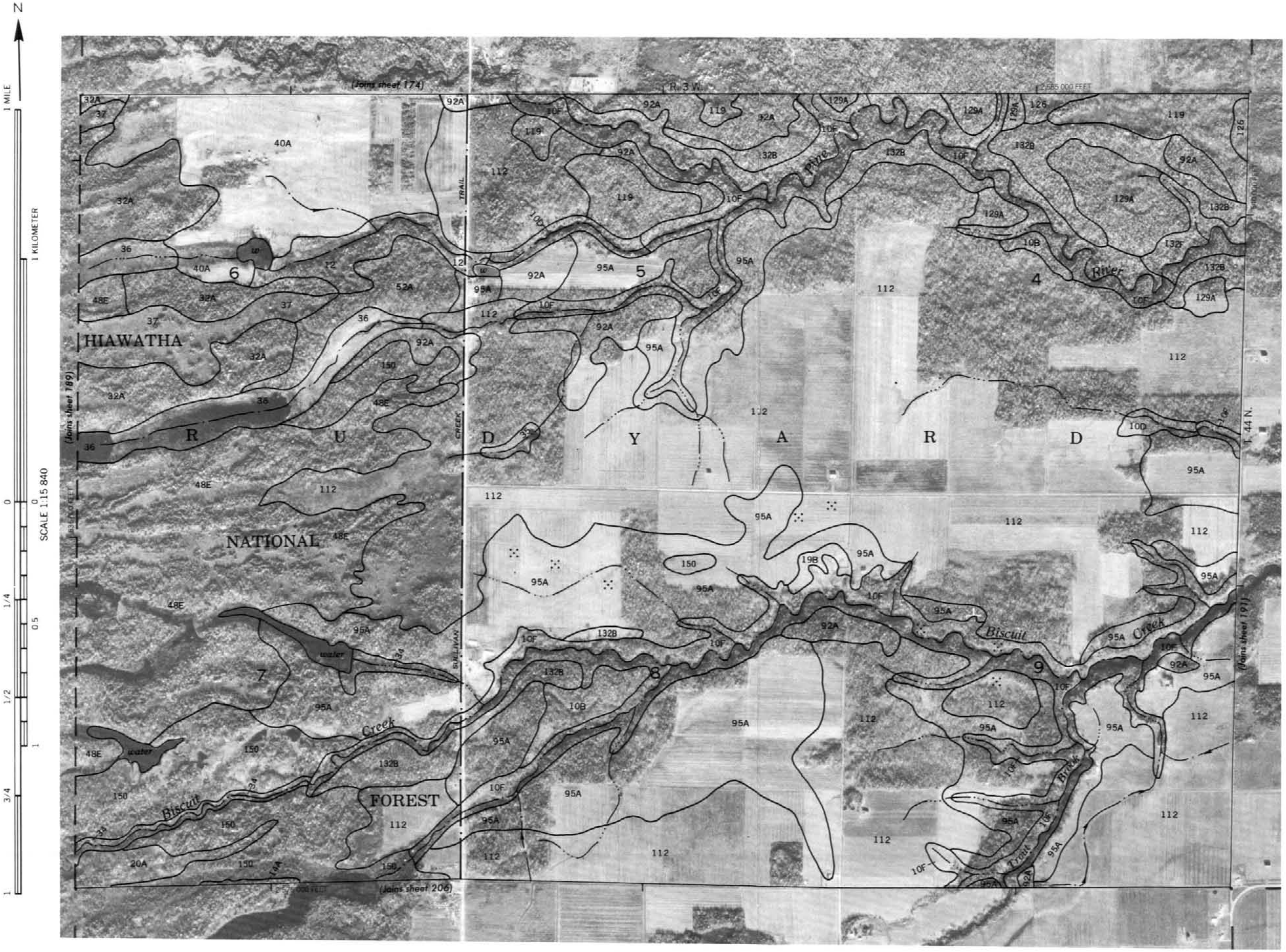
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 189


189
N
(Joins sheet 173)
(Joins sheet 188)
(Joins sheet 190)
(Joins sheet 205)
2 560 000 FEET
2 570 000 FEET
R. 4 W.
T. 44 N.
Pine River
HIAWATHA
TROUT LAKE
NATIONAL
FOREST
3
2
1
10
11
12
88A
23
87B
91B
37
48E
32A
34
137A
36
89A
39D
150
20A
water
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 190

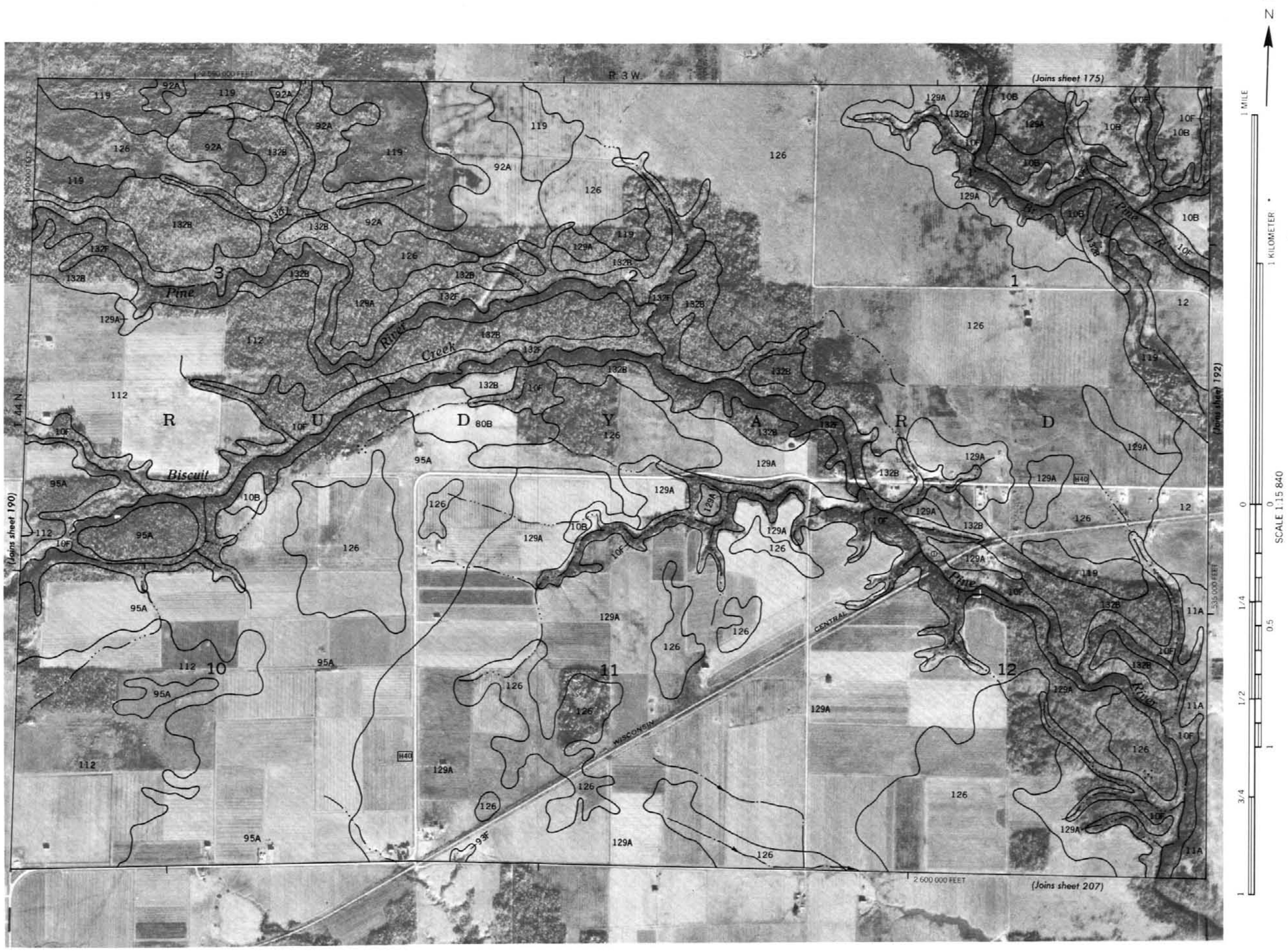

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 174)
(Joins sheet 189)
(Joins sheet 191)
(Joins sheet 206)
R. 3 W.
T. 44 N.
2 565 000 FEET
HIAWATHA
NATIONAL
FOREST
RUDYARD
Pine River
Biscuit Creek
Brook Trout
Sullivan Creek Trail
water
4
5
6
7
8
9
10B
10D
10F
12
19B
20A
32A
34
36
37
40A
48E
52A
92A
95A
112
119
126
129A
132B
150

CHIPPEWA COUNTY, MICHIGAN NO. 190

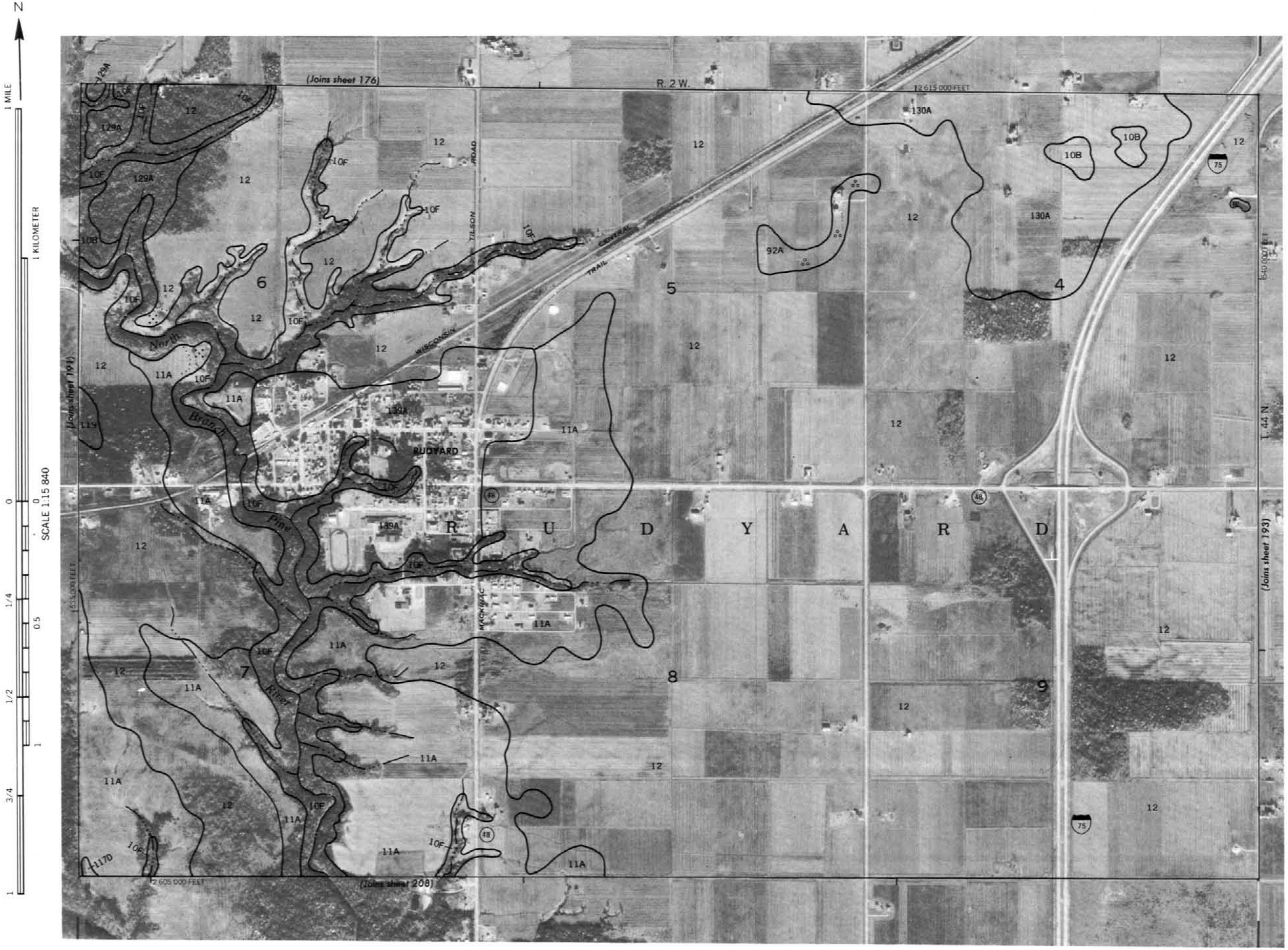
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 191


R 3 W.
(Joins sheet 175)
(Joins sheet 190)
(Joins sheet 192)
(Joins sheet 207)
T. 44 N.
2 600 000 FEET
535 000 FEET
Pine River
Biscuit Creek
Pine
River
CENTRAL
WISCONSIN
R U D Y A R D
H40
1
2
3
10
11
12
119
92A
126
132B
132F
129A
112
95A
10F
10B
80B
93F
11A
12
N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 192

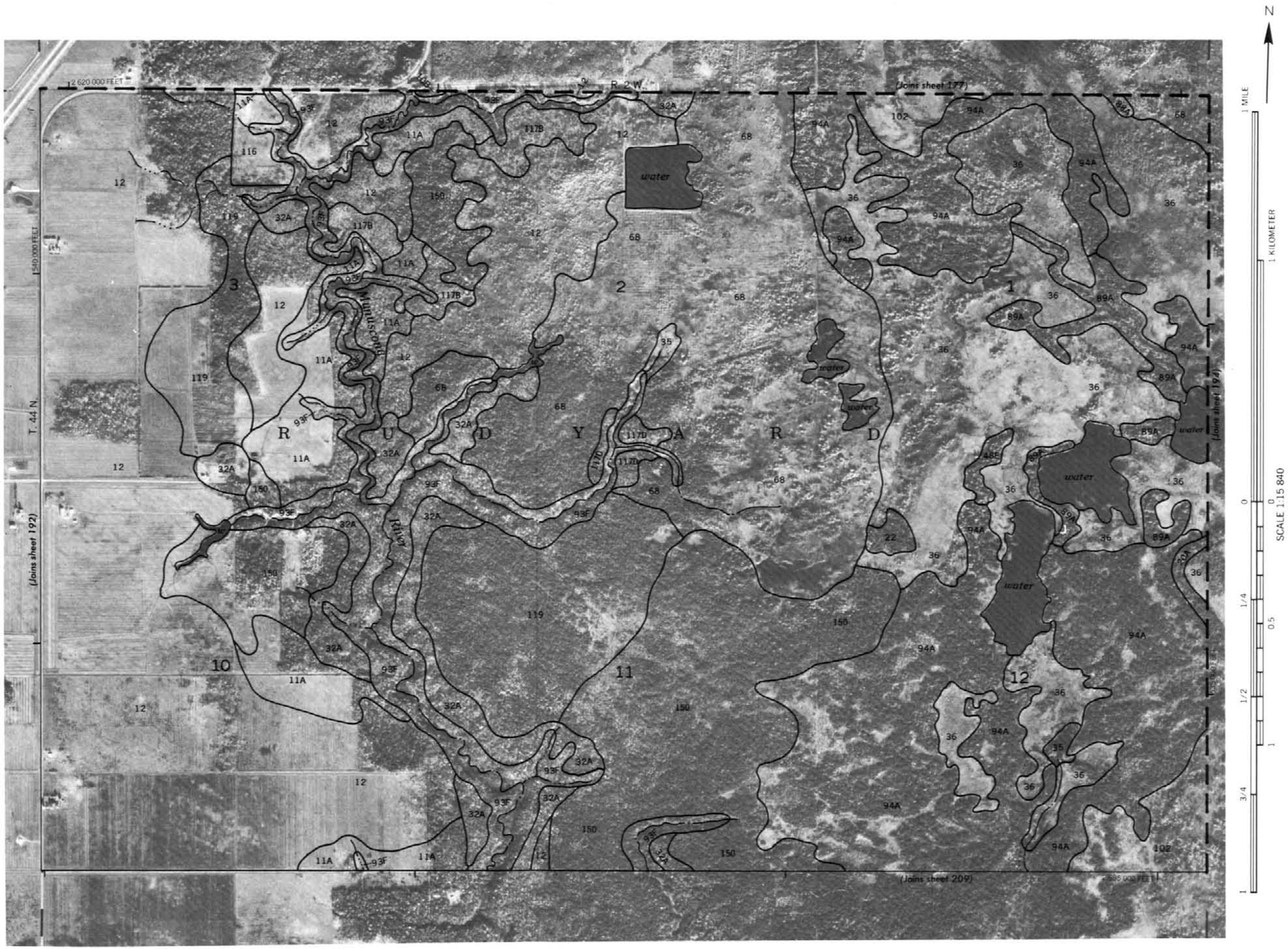

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 176)
R. 2 W.
2 615 000 FEET
(Joins sheet 191)
(Joins sheet 193)
(Joins sheet 208)
2 605 000 FEET
T. 44 N.
RUDYARD
R U D Y A R D
North Branch Pine River
TILSON ROAD
MACKINAC TRAIL
WISCONSIN CENTRAL
75
48
4
5
6
7
8
9
10B
10F
11A
12
92A
117D
119
129A
130A
139A

CHIPPEWA COUNTY, MICHIGAN NO. 192

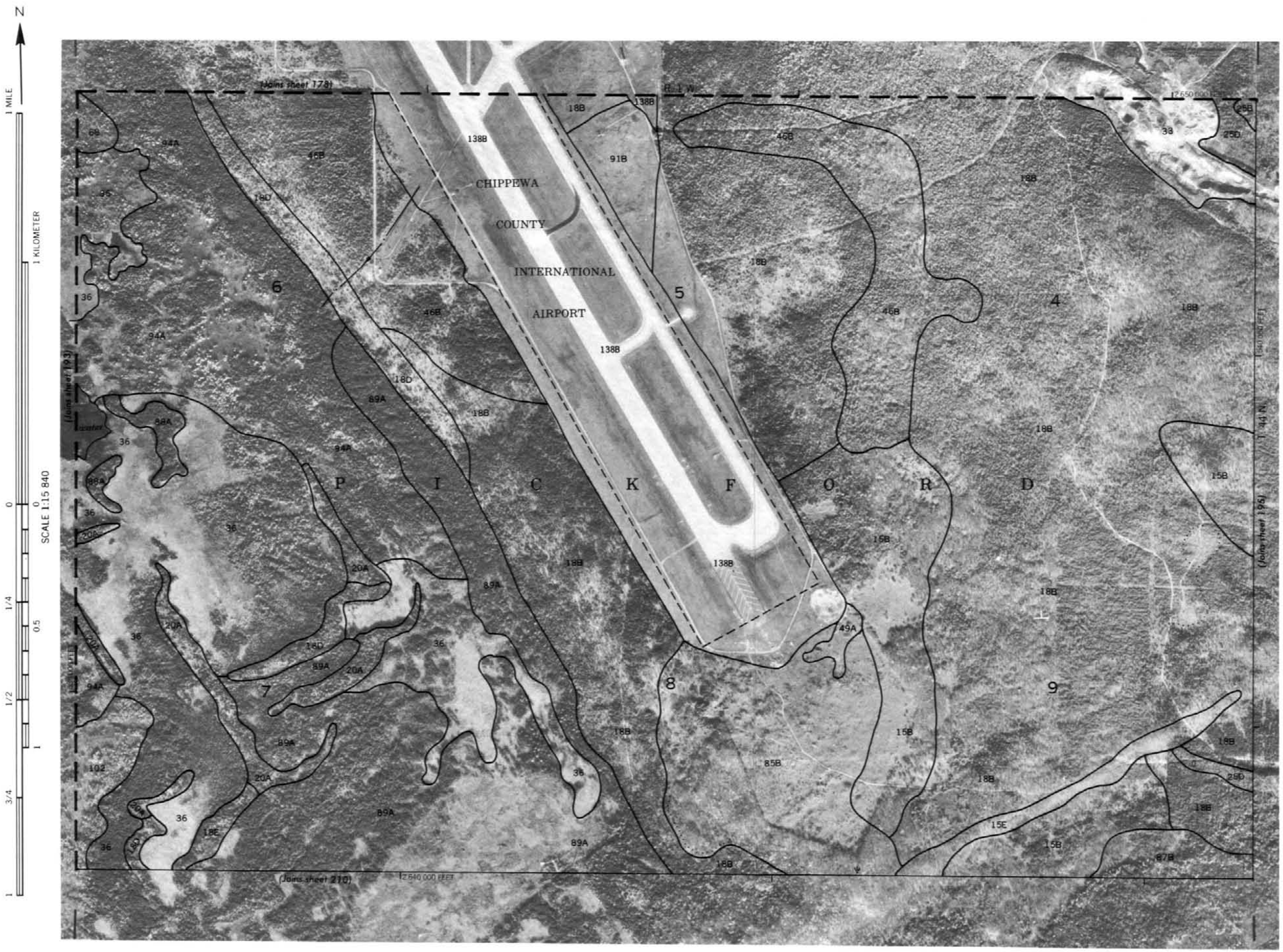
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 193


(Joins sheet 177)
(Joins sheet 192)
(Joins sheet 194)
(Joins sheet 209)
R. 2 W.
T. 44 N.
2 620 000 FEET
540 000 FEET
500 000 FEET
R U D Y A R D
Munuscong River
1
2
3
10
11
12
water
11A
12
116
119
150
93F
32A
117B
117D
68
35
36
22
94A
89A
48F
102
N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 194

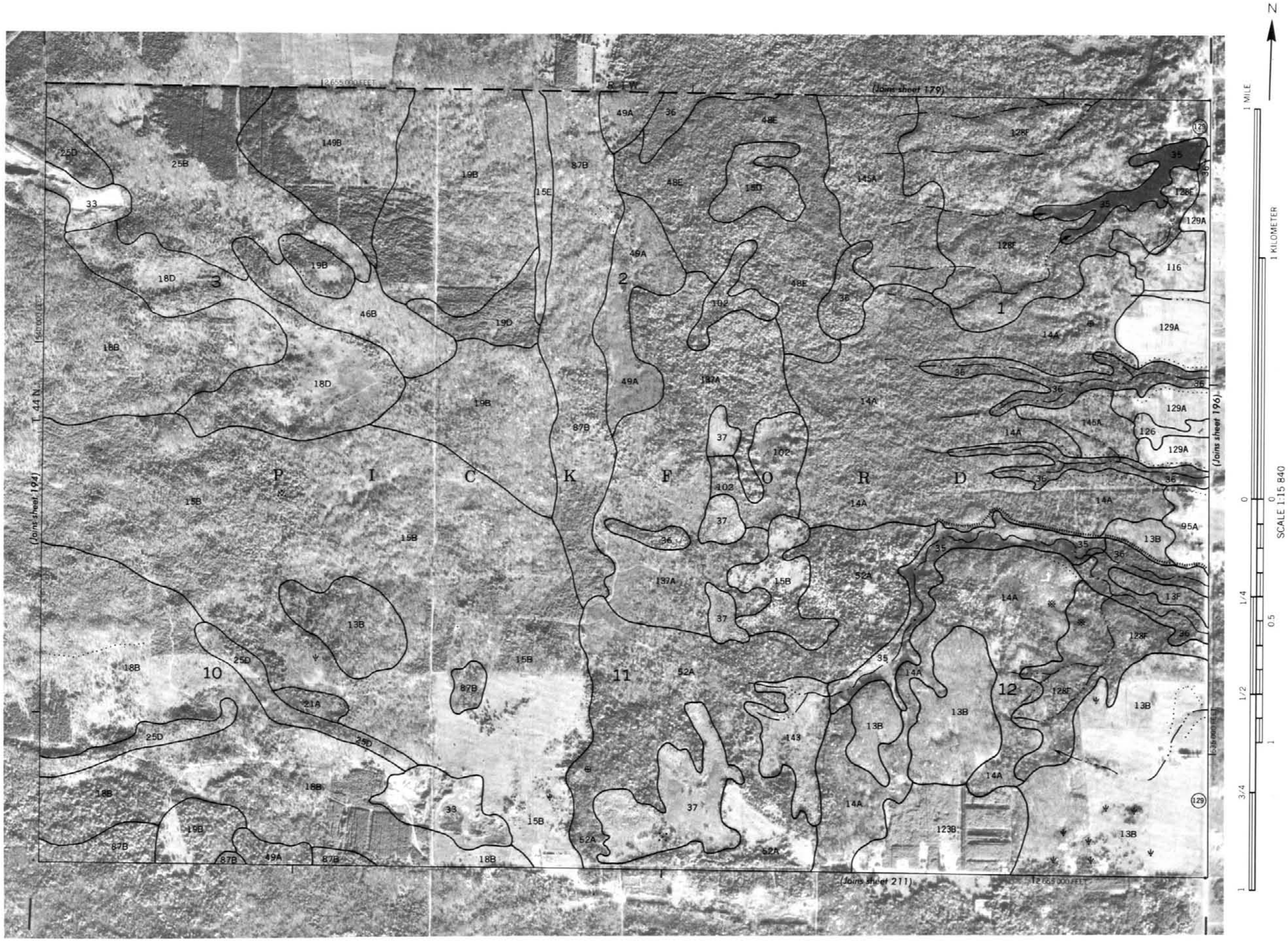

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 178)
(Joins sheet 193)
(Joins sheet 195)
(Joins sheet 210)
R. 1 W.
T. 44 N.
2 650 000 FEET
2 640 000 FEET
540 000 FEET
CHIPPEWA
COUNTY
INTERNATIONAL
AIRPORT
P I C K F O R D
6
5
4
7
8
9
water
138B
18B
91B
46B
94A
69
95
18D
36
89A
88A
20A
15B
49A
85B
15E
87B
102
18E
33
25B
25D

CHIPPEWA COUNTY, MICHIGAN NO. 194

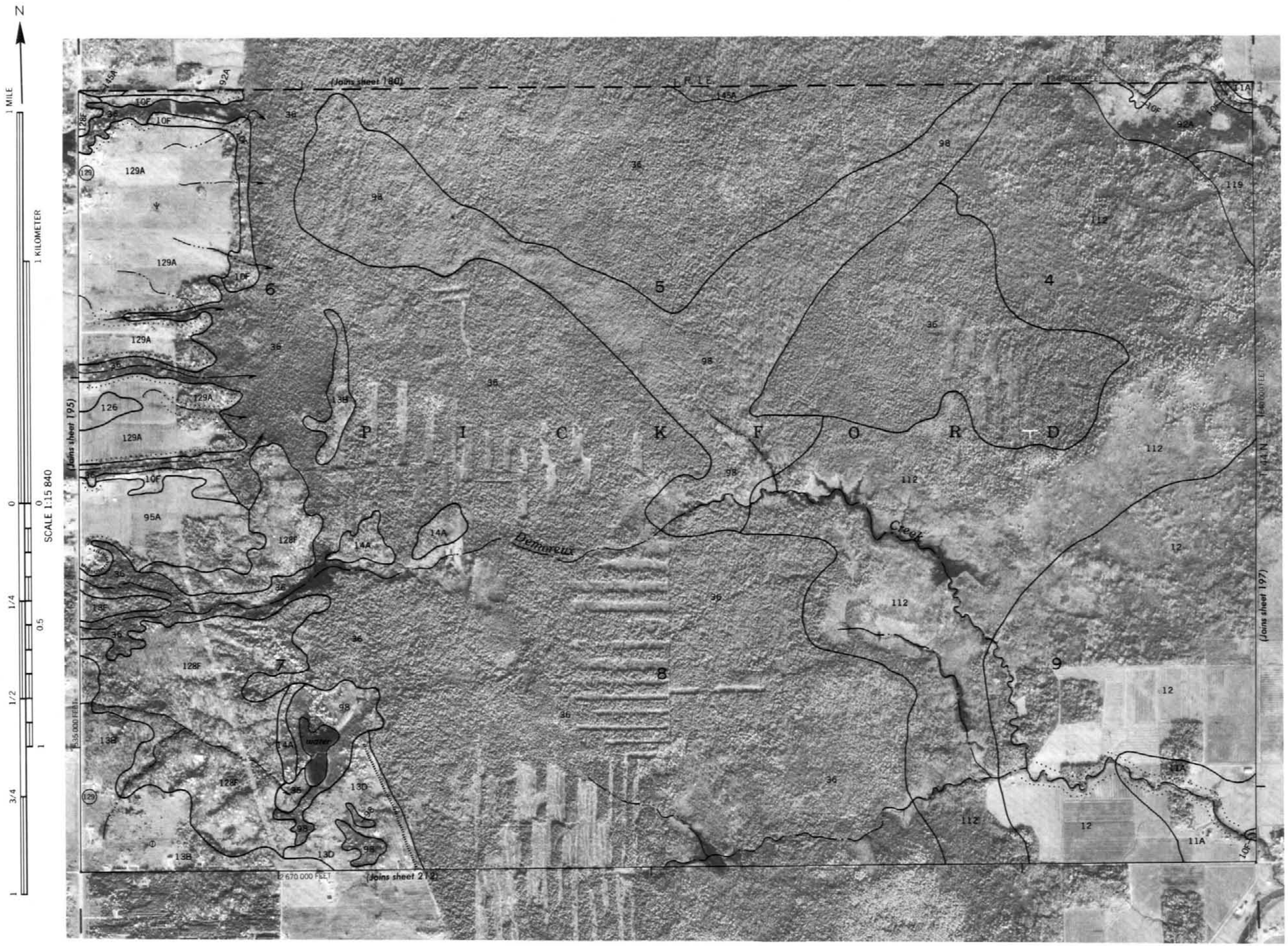
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 195

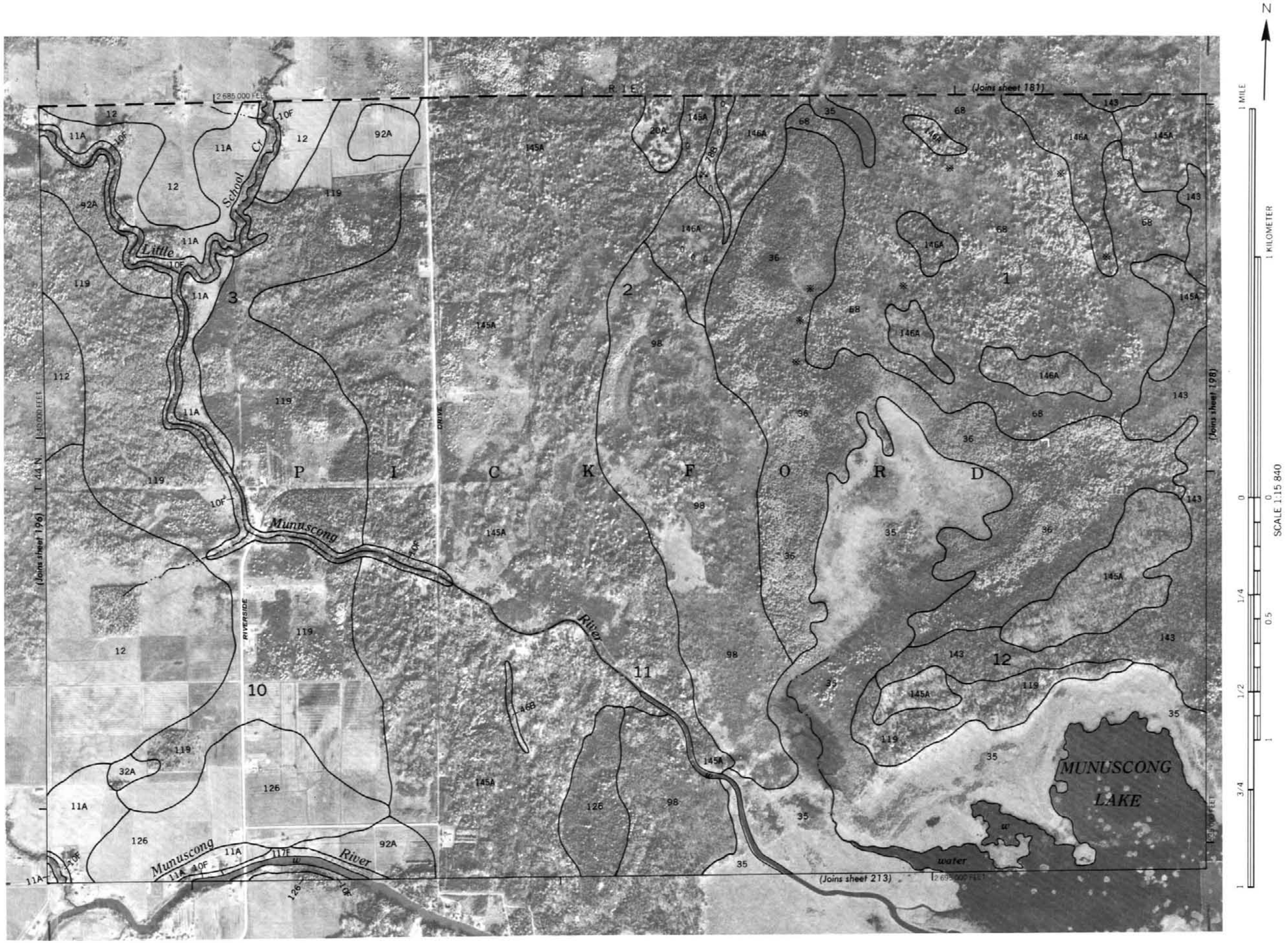

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
R. 1 W.
T. 44 N.
12 655 000 FEET
(Joins sheet 179)
(Joins sheet 194)
(Joins sheet 196)
(Joins sheet 211)
129
P I C K F O R D
1
2
3
10
11
12
25D
25B
33
149B
19B
15E
87B
49A
36
48E
18D
128F
145A
35
129A
116
46B
19D
102
137A
14A
18B
37
126
15B
95A
13B
52A
13F
25D
21A
143
123B
19B
49A

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 196


N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
SCALE 1:15 840
(Joins sheet 180)
(Joins sheet 195)
(Joins sheet 197)
(Joins sheet 212)
2 670 000 FEET
535 000 FEET
540 000 FEET
T. 44 N.
P I C K F O R D
Demoreux
Creek
water
5
4
6
7
8
9
129
145A
92A
10F
128F
36
98
129A
126
95A
14A
13B
13F
13D
11A
12
112
119

CHIPPEWA COUNTY, MICHIGAN NO. 196

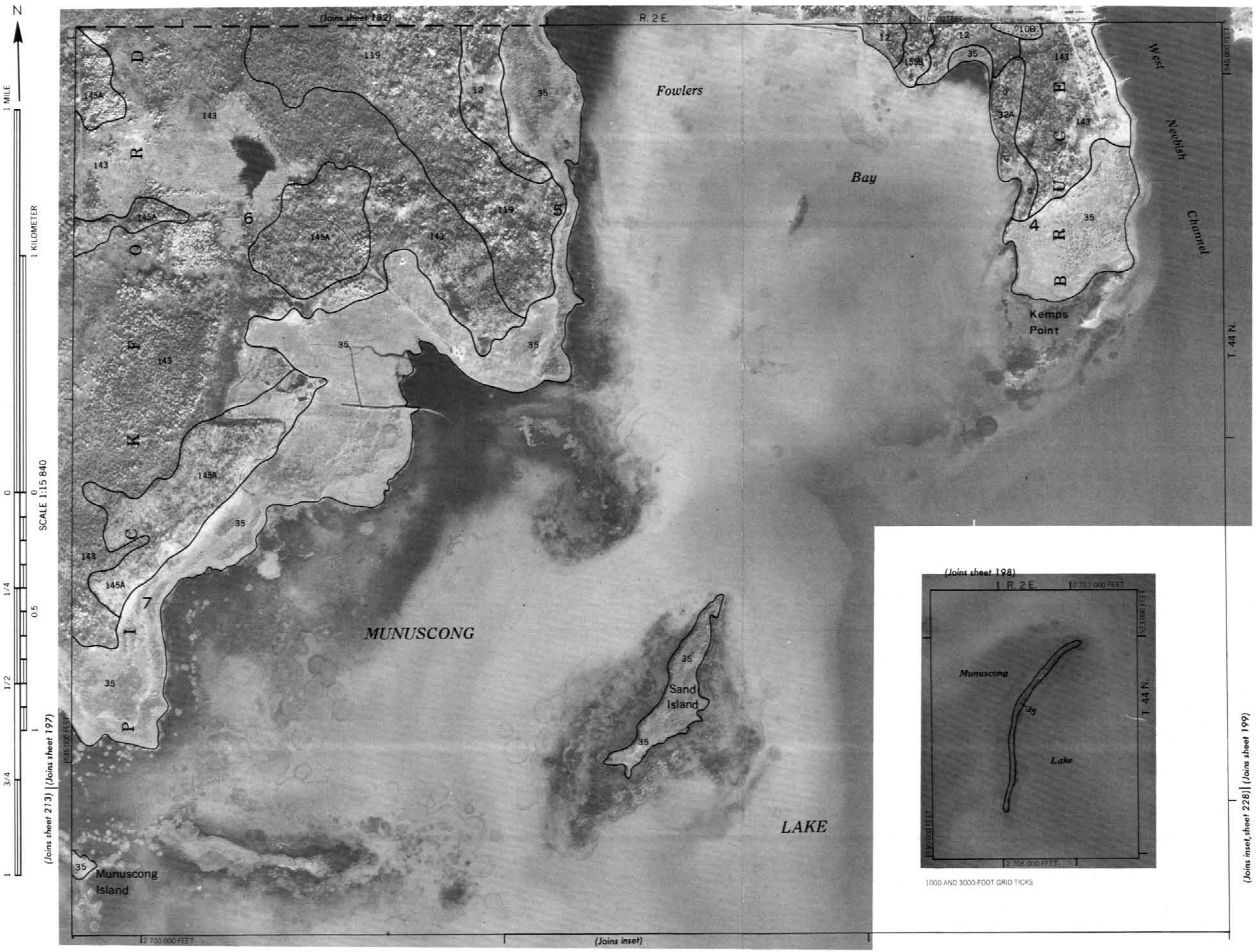
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
(Joins sheet 181)
(Joins sheet 196)
(Joins sheet 198)
(Joins sheet 213)
R. 1 E.
T. 44 N.
2 685 000 FEET
2 695 000 FEET
540 000 FEET
P I C K F O R D
Little School Cr.
Munuscong River
MUNUSCONG LAKE
water
w
DRIVE
RIVERSIDE
1
2
3
10
11
12
11A
10F
12
92A
119
112
32A
126
117F
145A
146A
146B
20A
28B
98
68
35
36
143
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 197

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 198


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 182)
R. 2 E.
Fowlers
Bay
West
Neebish
Channel
Kemps
Point
T. 44 N.
BRUCE
OKFORD
PICKFORD
4
5
6
7
MUNUSCONG
LAKE
Sand
Island
Munuscong
Island
12
35
10B
143
155B
32A
119
145A
(Joins sheet 213)
(Joins sheet 197)
(Joins inset, sheet 228)
(Joins sheet 199)
(Joins inset)
2 700 000 FEET
(Joins sheet 198)
Munuscong
Lake
2 706 000 FEET
1000 AND 3000-FOOT GRID TICKS

CHIPPEWA COUNTY, MICHIGAN NO. 198

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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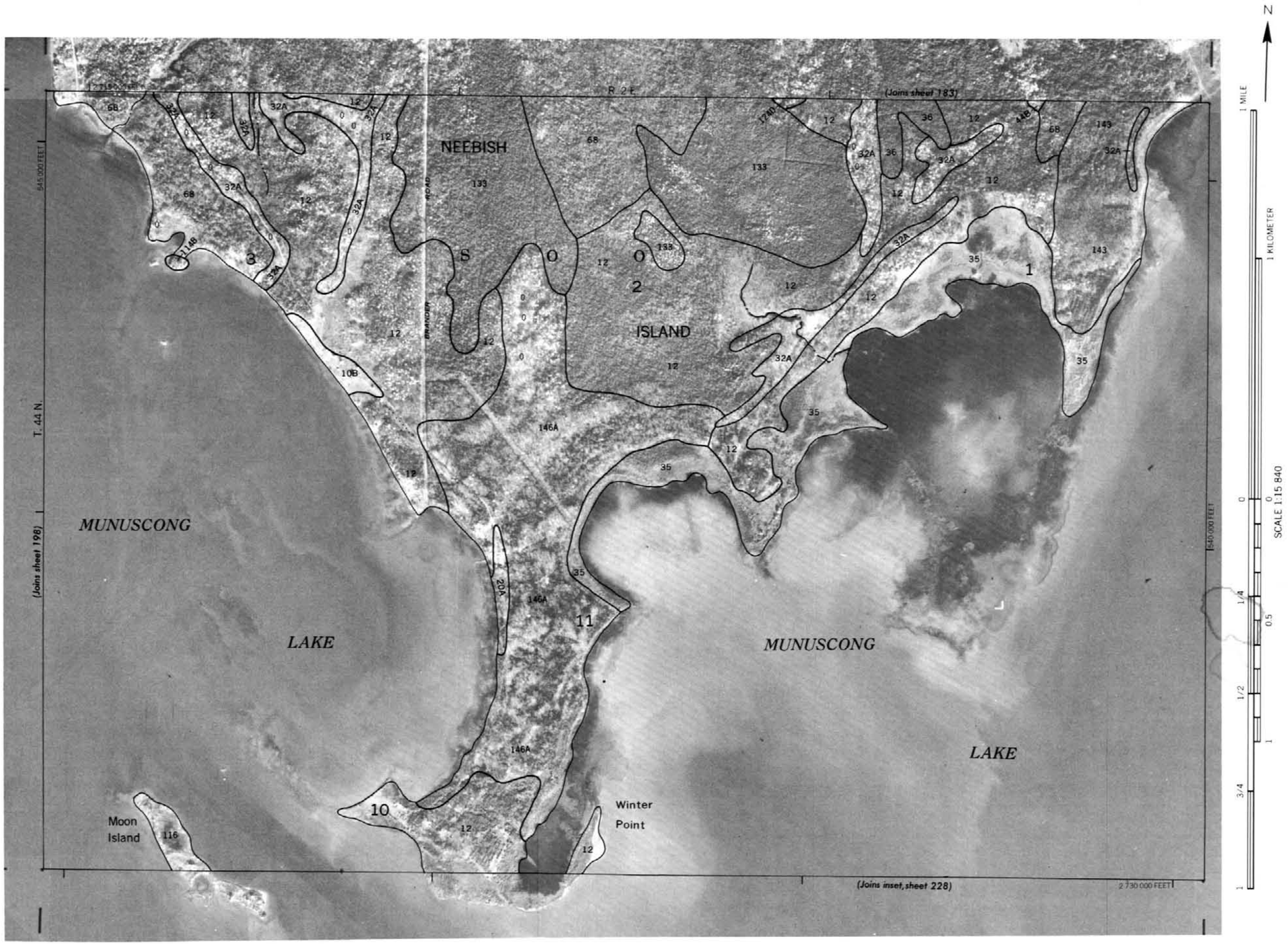
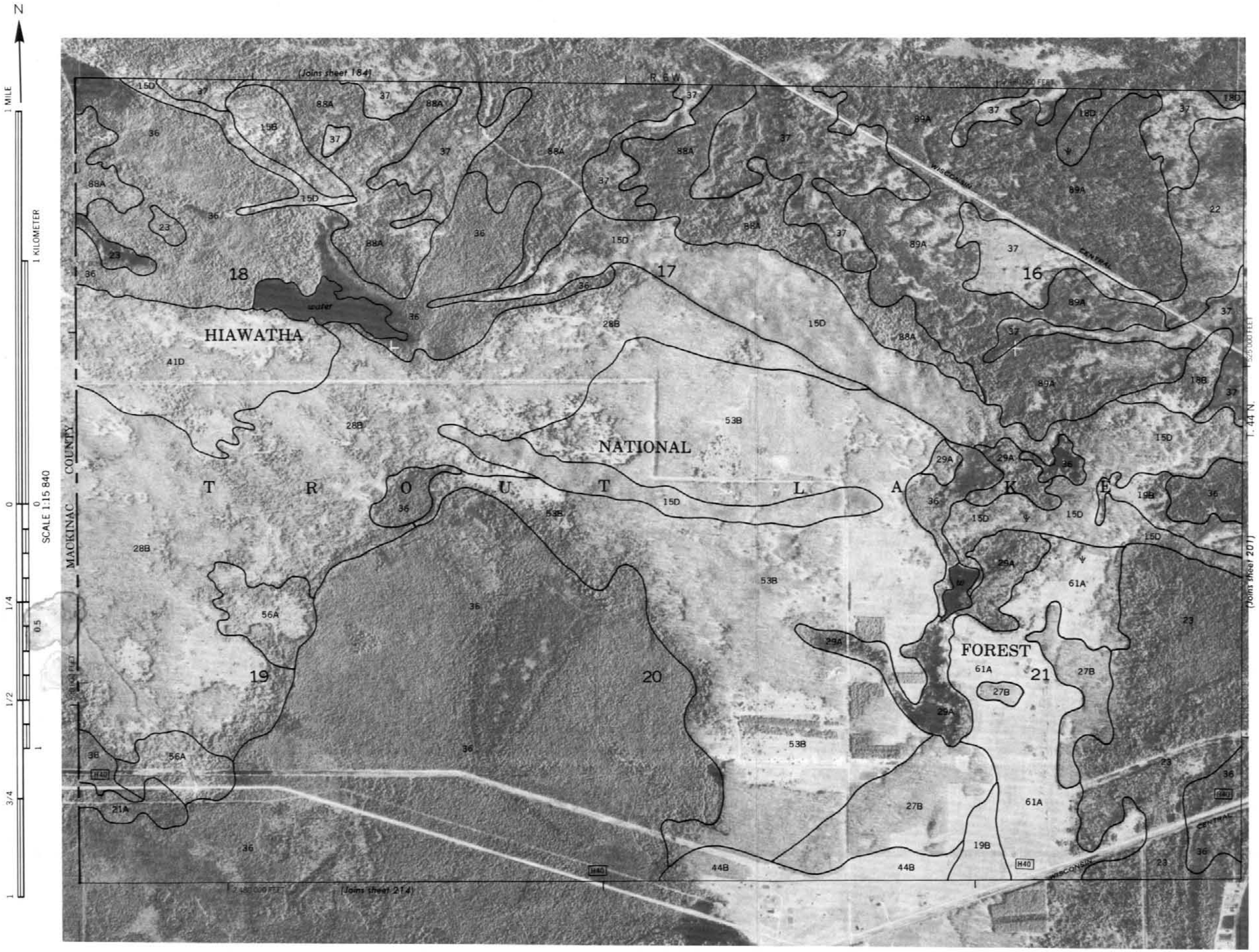
CHIPPEWA COUNTY, MICHIGAN NO. 199


N
(Joins sheet 183)
R 2 E
NEEBISH
ISLAND
S O O
1
2
3
10
11
MUNUSCONG
LAKE
MUNUSCONG
LAKE
Moon
Island
Winter
Point
BRANDER ROAD
T. 44 N.
(Joins sheet 198)
(Joins inset, sheet 228)
545 000 FEET
540 000 FEET
2 730 000 FEET
6B
12
32A
32E
0
133
174B
36
44B
143
35
114B
10B
146A
20A
116
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
0.5
1/2
3/4
1
(Joins sheet 184)
R. 6 W.
(Joins sheet 201)
T. 44 N.
(Joins sheet 214)
MACKINAC COUNTY
HIAWATHA NATIONAL FOREST
TROUT LAKE
16
17
18
19
20
21
water
WISCONSIN CENTRAL
H40
15D
15B
18D
18B
19B
21A
22
23
27B
28B
29A
36
37
41D
44B
53B
56A
61A
88A
89A

CHIPPEWA COUNTY, MICHIGAN NO. 200

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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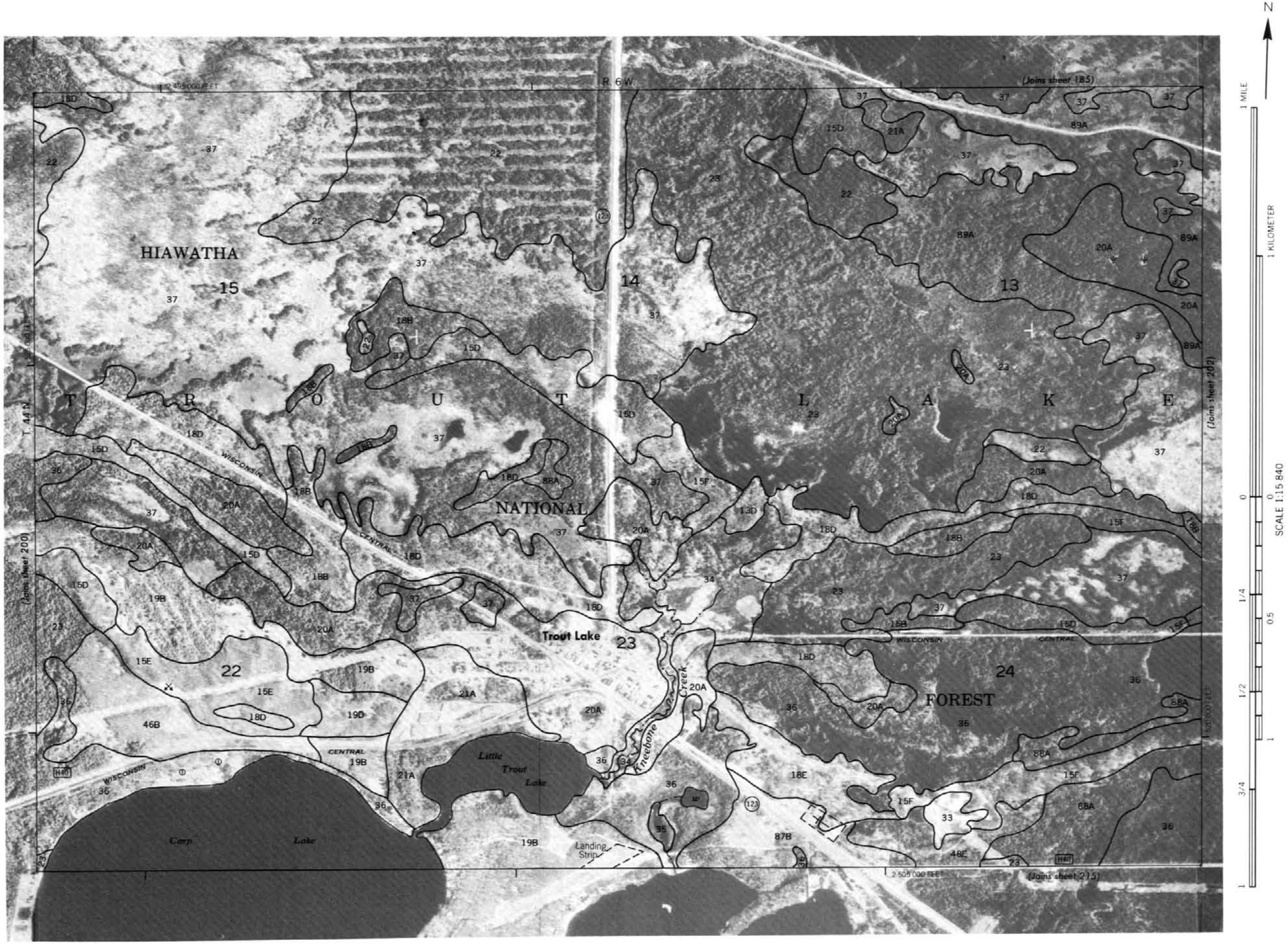
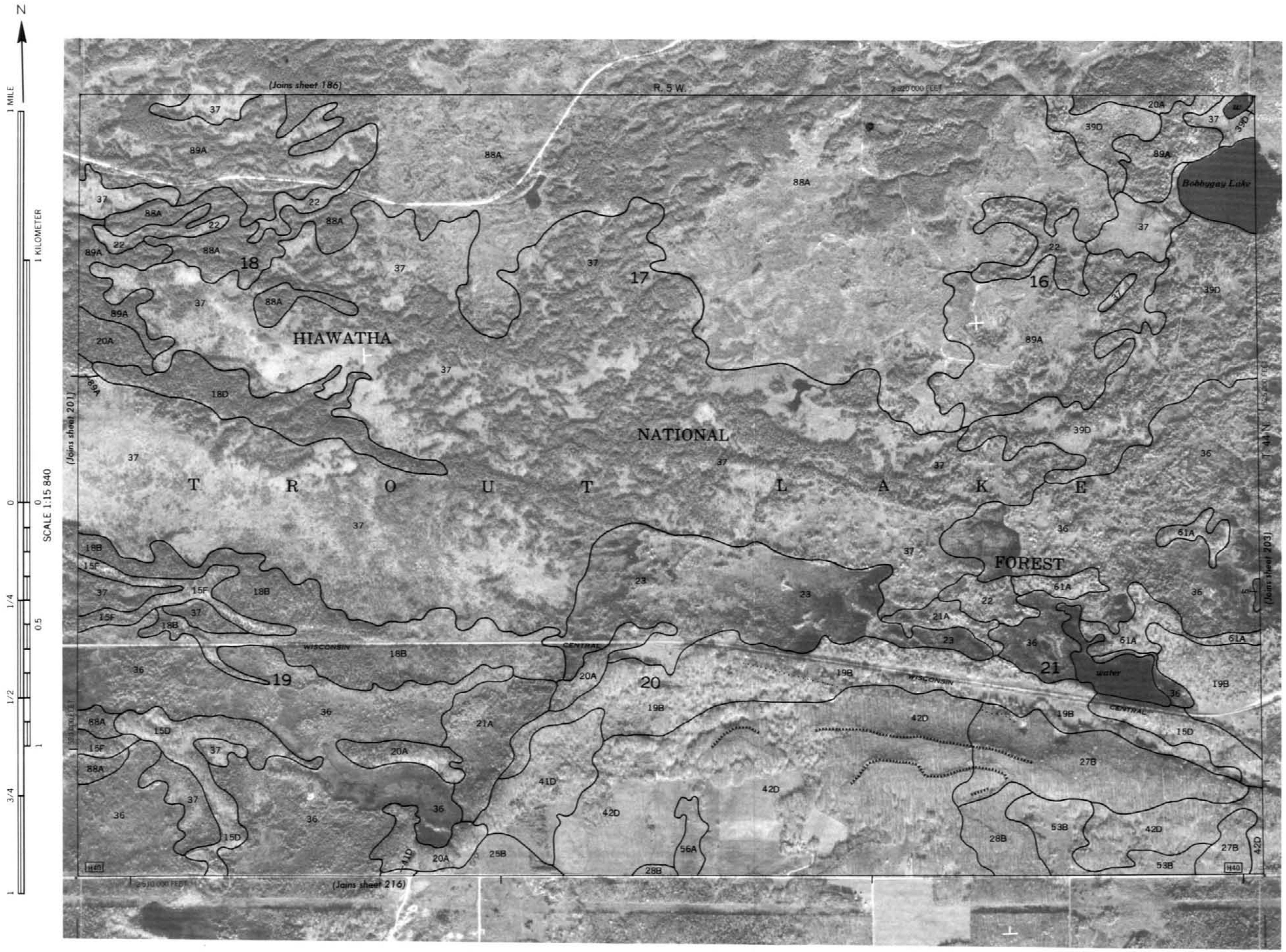
CHIPPEWA COUNTY, MICHIGAN NO. 201


N
R 6 W
(Joins sheet 185)
(Joins sheet 202)
(Joins sheet 215)
(Joins sheet 200)
T. 44 N.
2 505 000 FEET
HIAWATHA
NATIONAL
FOREST
TROUT LAKE
15
14
13
22
23
24
Trout Lake
Little Trout Lake
Carp Lake
Kneebone Creek
Landing Strip
WISCONSIN CENTRAL
123
H40
18D
37
22
15D
21A
89A
20A
18B
15F
13D
19B
15E
46B
19D
36
34
35
33
87B
18E
88A
48E
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

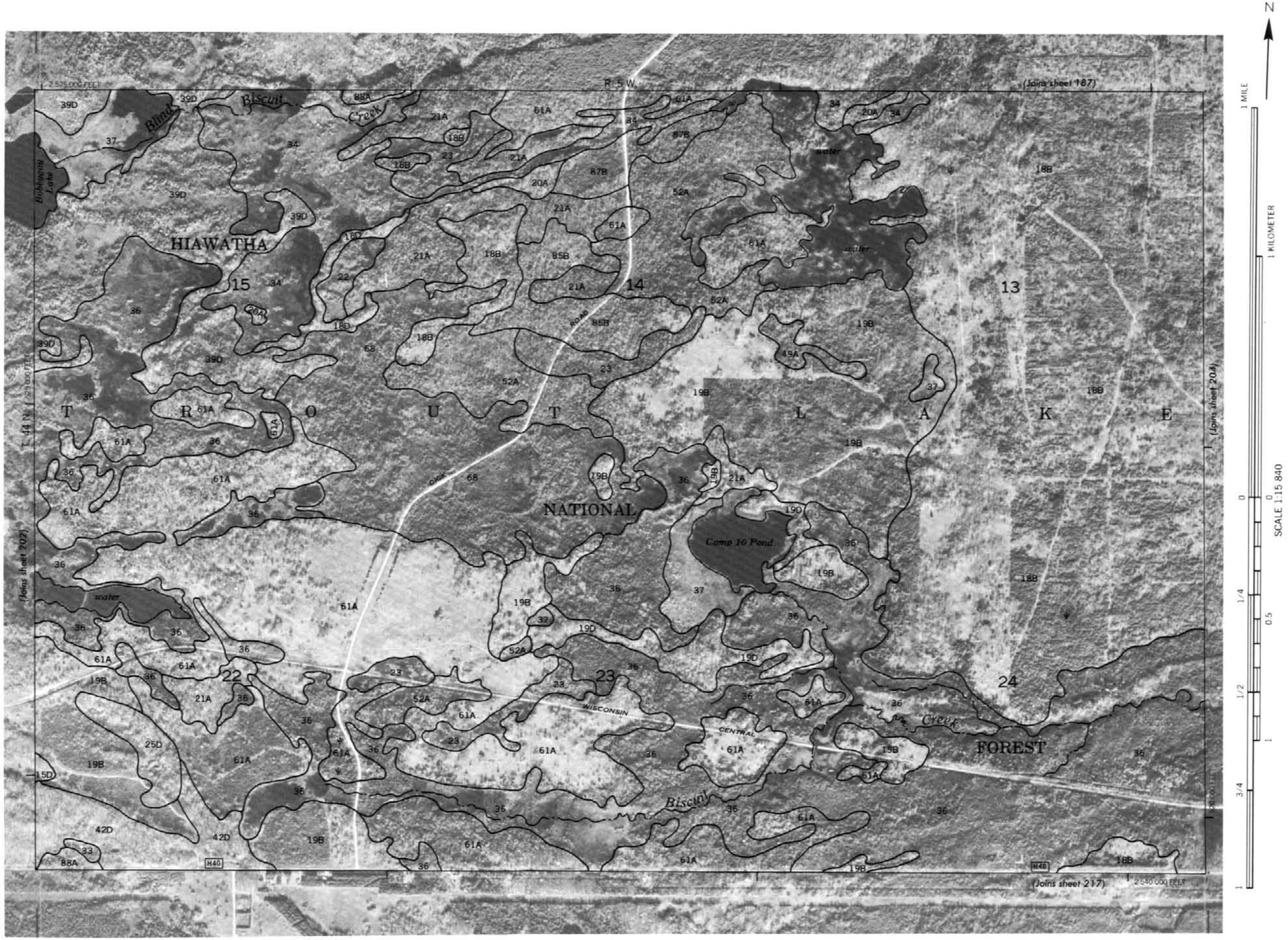
(202)

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 202


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
(Joins sheet 186)
R. 5 W.
2 520 000 FEET
(Joins sheet 201)
(Joins sheet 203)
(Joins sheet 216)
T. 44 N.
HIAWATHA
NATIONAL
FOREST
T R O U T L A K E
Bobbygay Lake
water
w
WISCONSIN
CENTRAL
H40
16
17
18
19
20
21
37
89A
88A
22
20A
18D
15F
18B
15D
36
21A
41D
42D
56A
28B
25B
23
19B
27B
53B
39D
61A
15D

CHIPPEWA COUNTY, MICHIGAN NO. 202

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

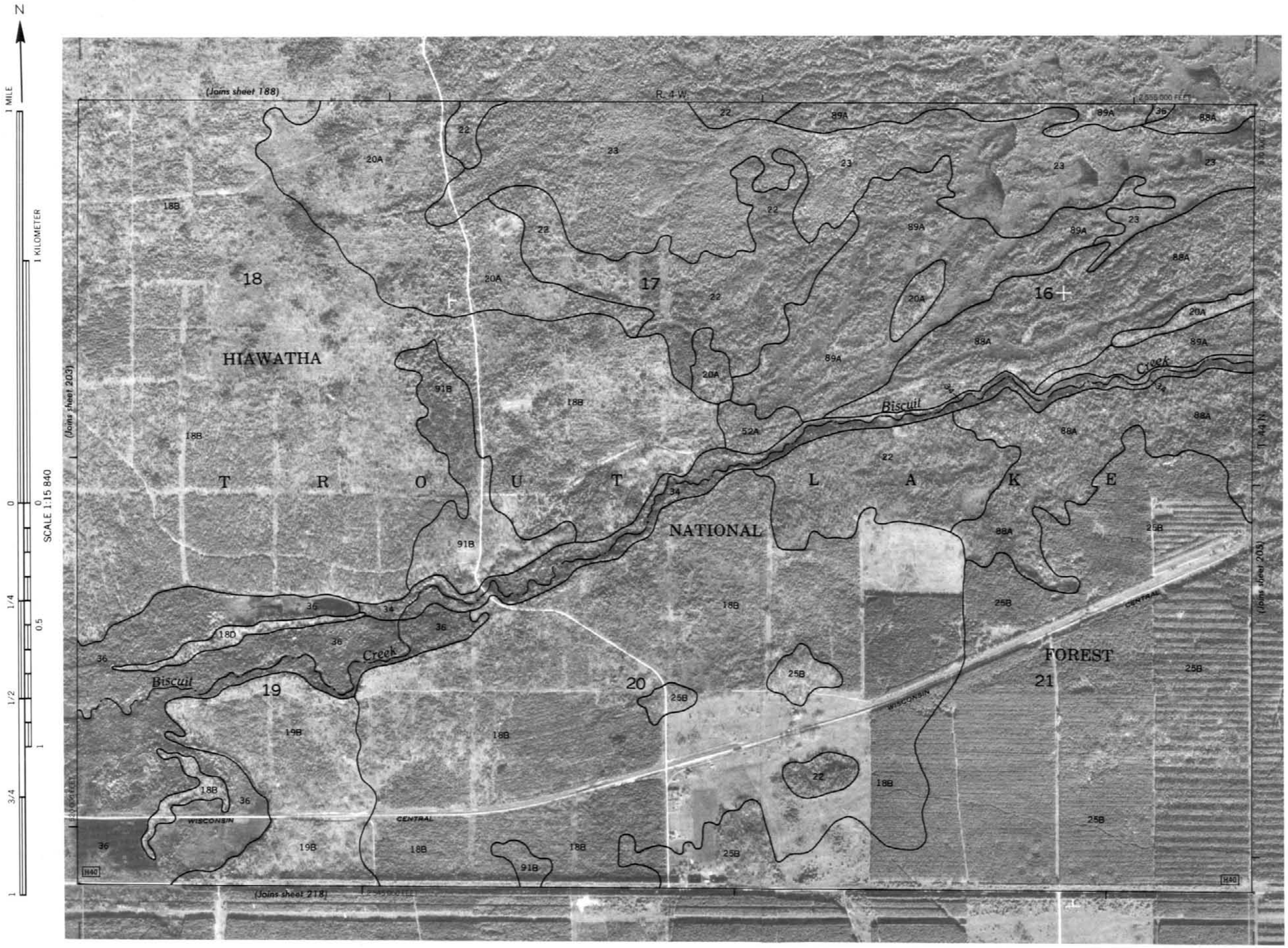

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
2 525 000 FEET
2 540 000 FEET
R. 5 W.
T. 44 N.
(Joins sheet 187)
(Joins sheet 204)
(Joins sheet 217)
(Joins sheet 202)
HIAWATHA
NATIONAL
FOREST
T R O U T L A K E
15
14
13
22
23
24
Blind
Biscuit
Creek
Bobuggay Lake
water
Camp 10 Pond
ROAD
WISCONSIN
CENTRAL
H40
39D
37
34
36
61A
21A
18B
23
20A
87B
52A
85B
18D
22
68
39D
19B
49A
19D
25D
42D
15D
33
88A
84

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 203

204

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 204

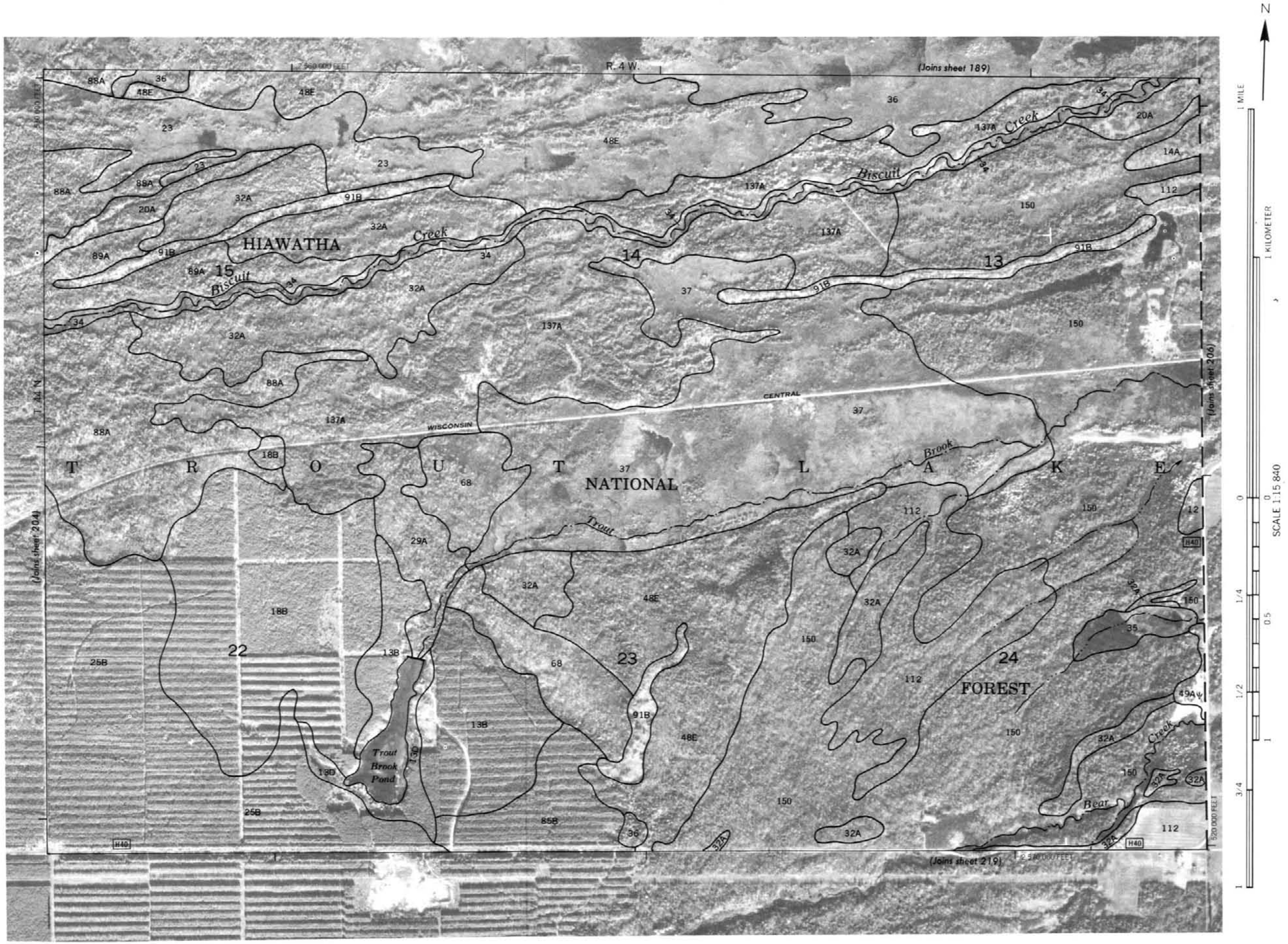

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 188)
R. 4 W.
2 550 000 FEET
(Joins sheet 203)
(Joins sheet 205)
(Joins sheet 218)
T. 44 N.
HIAWATHA
T R O U T
L A K E
NATIONAL
FOREST
18
17
16
19
20
21
Biscuit
Creek
WISCONSIN
CENTRAL
H40
22
89A
36
88A
20A
23
18B
91B
52A
34
18D
19B
25B

CHIPPEWA COUNTY, MICHIGAN NO. 204

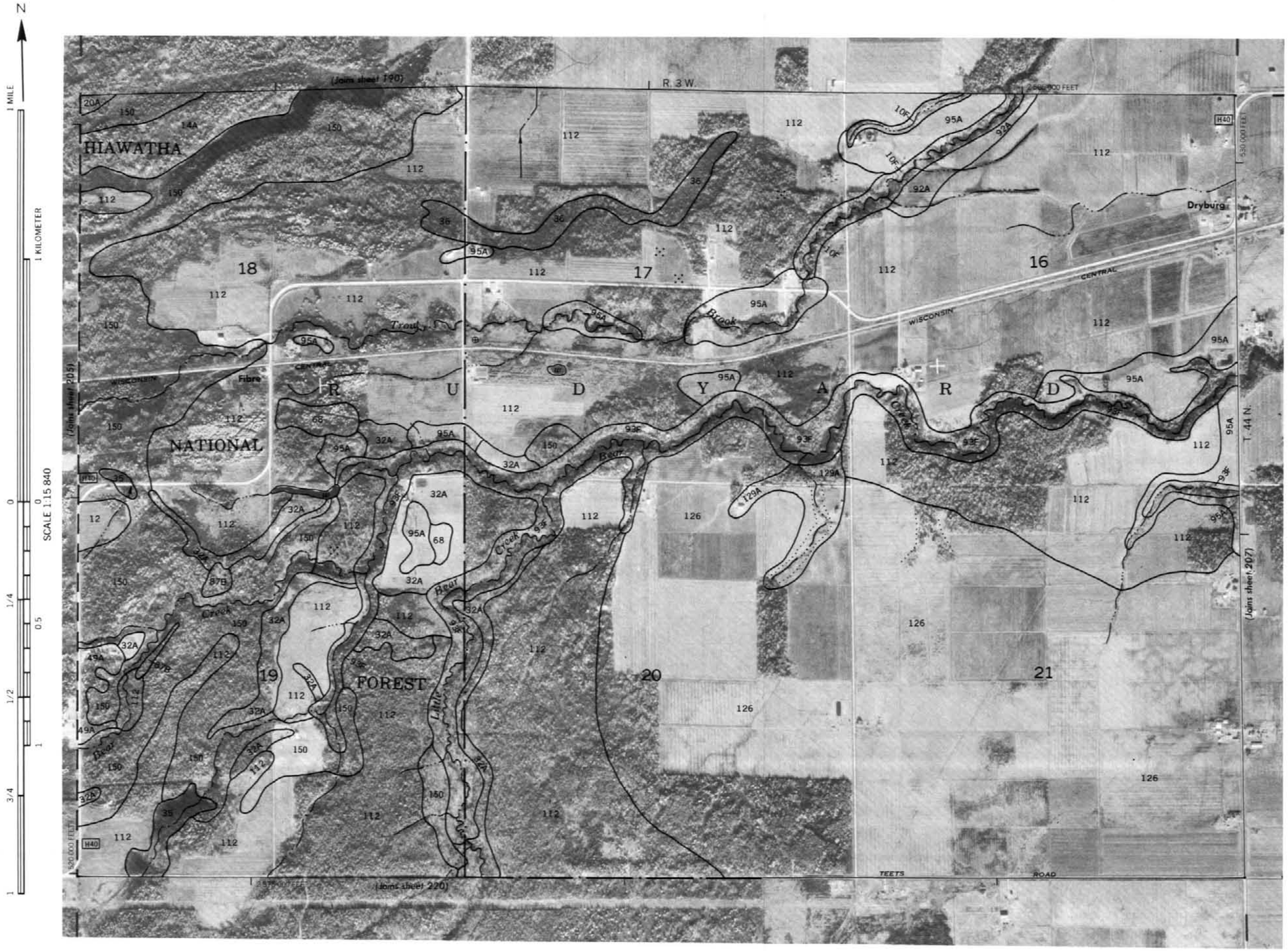
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 205


N
(Joins sheet 189)
R. 4 W.
(Joins sheet 204)
(Joins sheet 206)
(Joins sheet 219)
T. 44 N.
HIAWATHA
NATIONAL
FOREST
T R O U T L A K E
Biscuit Creek
Trout Brook
Bear Creek
Trout Brook Pond
CENTRAL
WISCONSIN
15
14
13
22
23
24
88A
36
48E
23
20A
14A
112
137A
150
91B
32A
89A
34
37
18B
68
29A
12
35
49A
13B
13D
25B
85B
H40
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

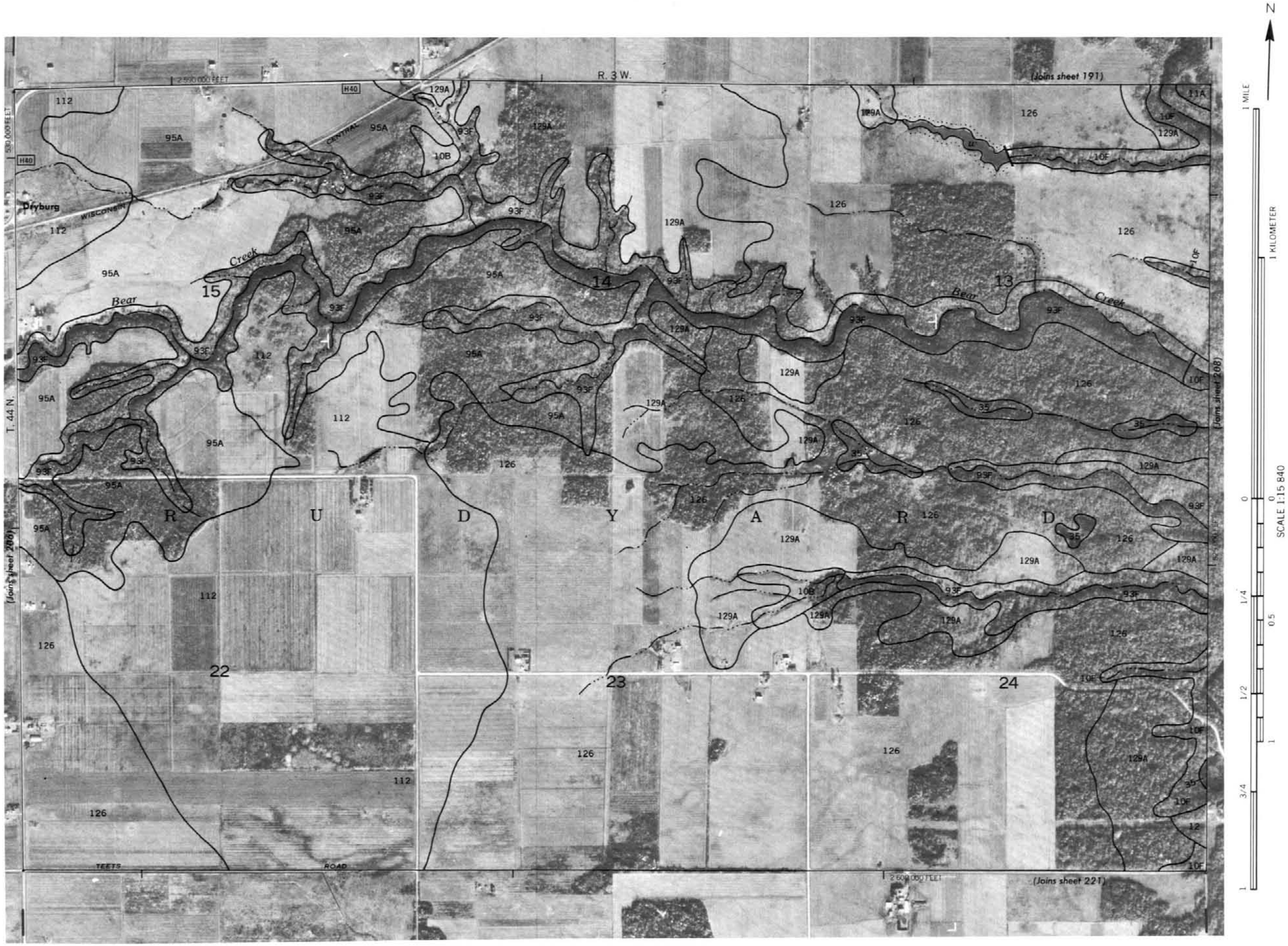
SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 206


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 190)
(Joins sheet 205)
(Joins sheet 207)
(Joins sheet 220)
R. 3 W.
T. 44 N.
2 600 000 FEET
530 000 FEET
520 000 FEET
H40
HIAWATHA
NATIONAL
FOREST
R U D Y A R D
Fibre
Dryburg
WISCONSIN CENTRAL
Trout Brook
Bear Creek
Little Bear Creek
TEETS ROAD
16
17
18
19
20
21
20A
150
14A
112
36
95A
10F
92A
93F
32A
68
35
12
37B
49A
129A
126

CHIPPEWA COUNTY, MICHIGAN NO. 206

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 207

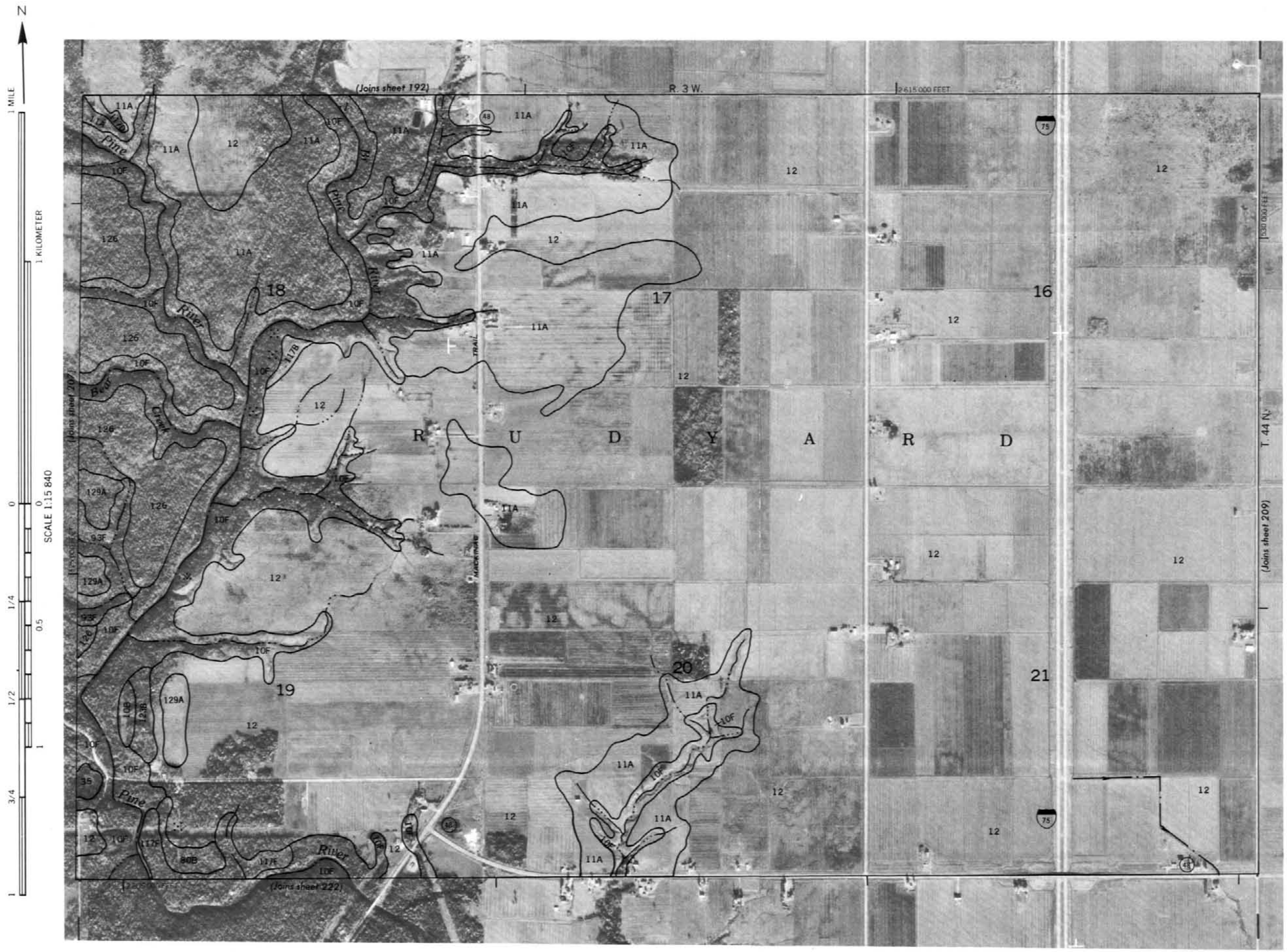


207
N
R. 3 W.
(Joins sheet 191)
2 590 000 FEET
H40
129A
95A
112
10B
93F
126
11A
10F
Dryburg
WISCONSIN
CENTRAL
Bear
Creek
15
14
13
T. 44 N.
530 000 FEET
(Joins sheet 206)
(Joins sheet 208)
35
R U D Y A R D
22
23
24
12
TEETS
ROAD
2 600 000 FEET
(Joins sheet 221)
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 207

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 208

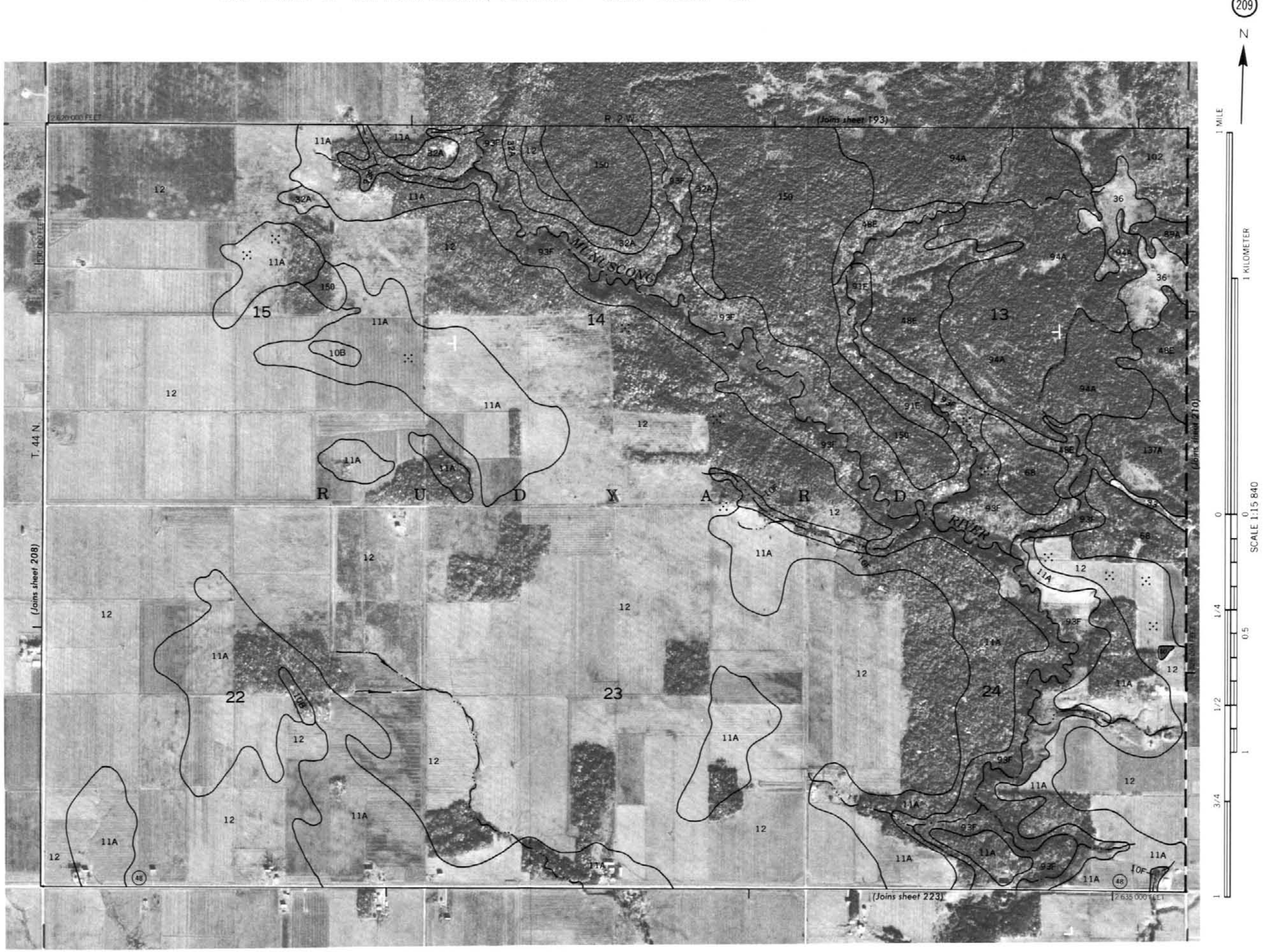

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 192)
R. 3 W.
2 615 000 FEET
(Joins sheet 207)
(Joins sheet 209)
(Joins sheet 222)
530 000 FEET
T. 44 N.
48
75
Pine River
Bear Creek
Little Pine River
MACKINAW TRAIL
R U D Y A R D
16
17
18
19
20
21
11A
12
10F
126
129A
93F
117B
117F
129B
80B
35

CHIPPEWA COUNTY, MICHIGAN NO. 208

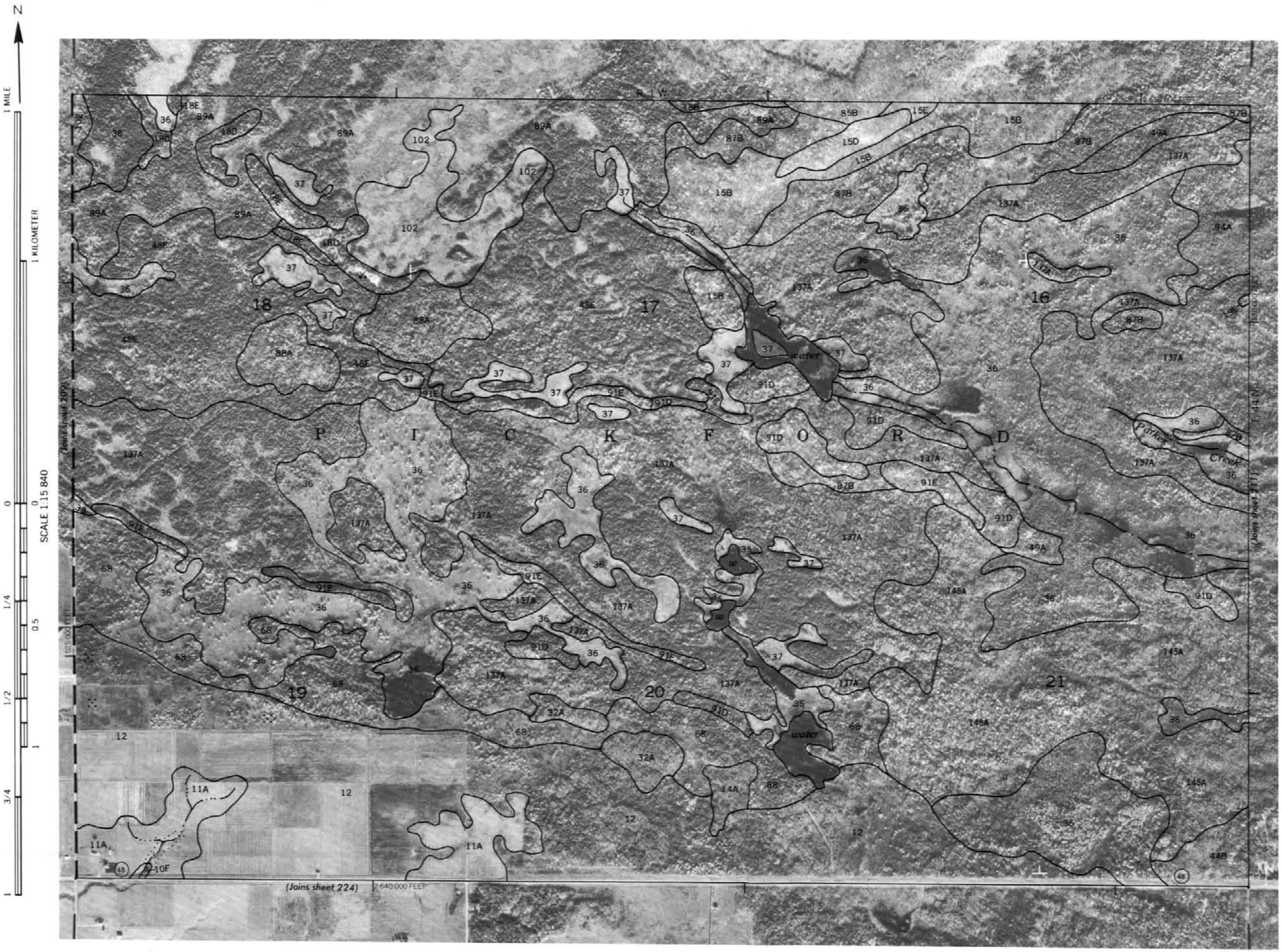
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 209


209
N
R. 2 W.
(Joins sheet 193)
(Joins sheet 208)
(Joins sheet 210)
(Joins sheet 223)
T. 44 N.
2 620 000 FEET
2 635 000 FEET
MUNUSCONG
RIVER
R U D Y A R D
13
14
15
22
23
24
11A
12
32A
93F
150
94A
102
36
89A
48E
91E
137A
68
10B
10F
48
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 210


N
1 MILE
1 KILOMETER
0
0
SCALE 1:15 840
1/4
0.5
1/2
1
3/4
1
R 1 W
(Joins sheet 209)
(Joins sheet 211)
(Joins sheet 224)
525 000 FEET
2 640 000 FEET
18
17
16
19
20
21
P I C K F O R D
Parker Creek
water
36
18E
89A
18D
37
102
89A
48E
88A
91E
91D
137A
87B
85B
15E
15B
15D
94A
49A
35
145A
32A
68
12
11A
10F
14A
44B
48

CHIPPEWA COUNTY, MICHIGAN NO. 210

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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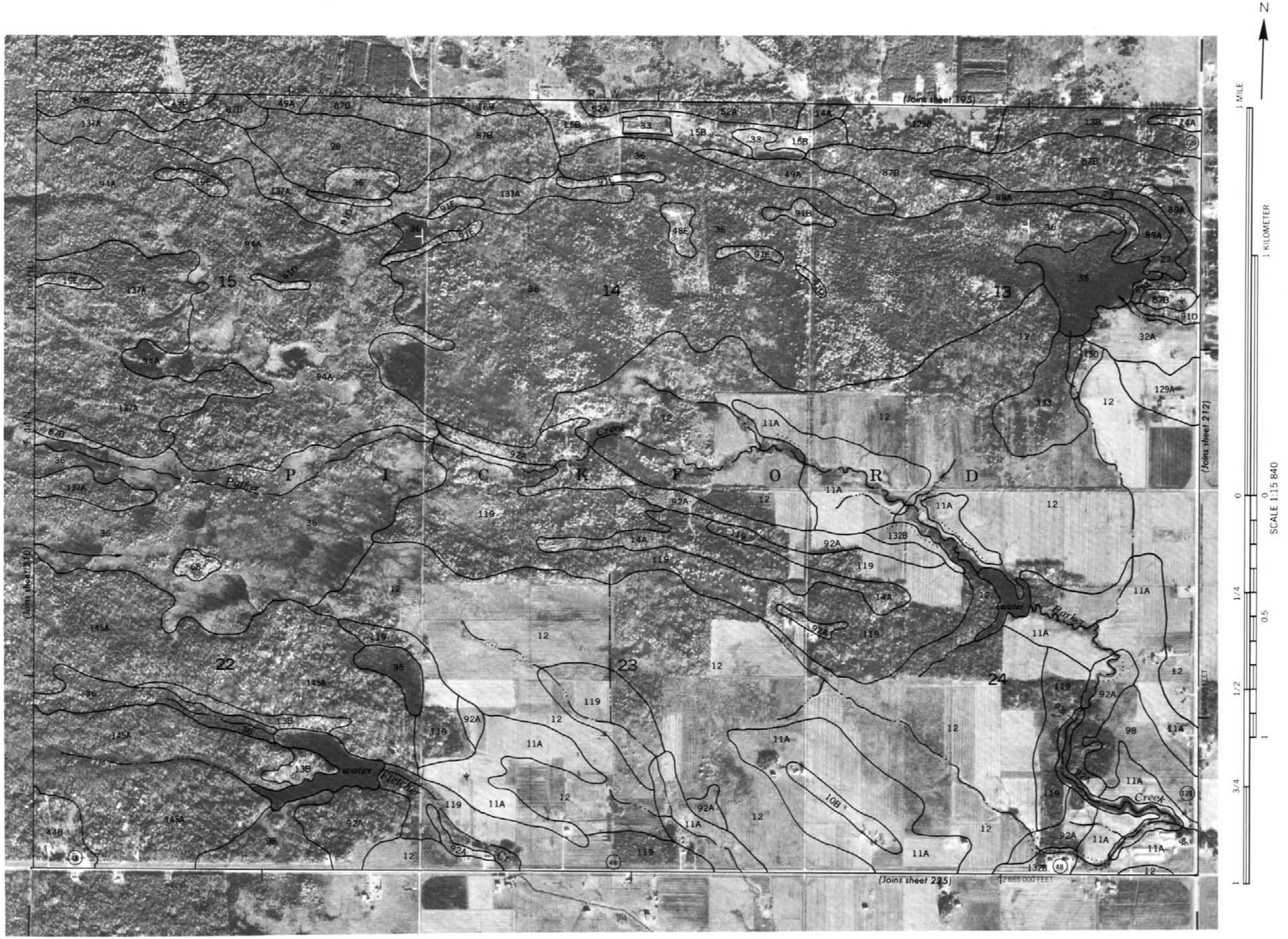
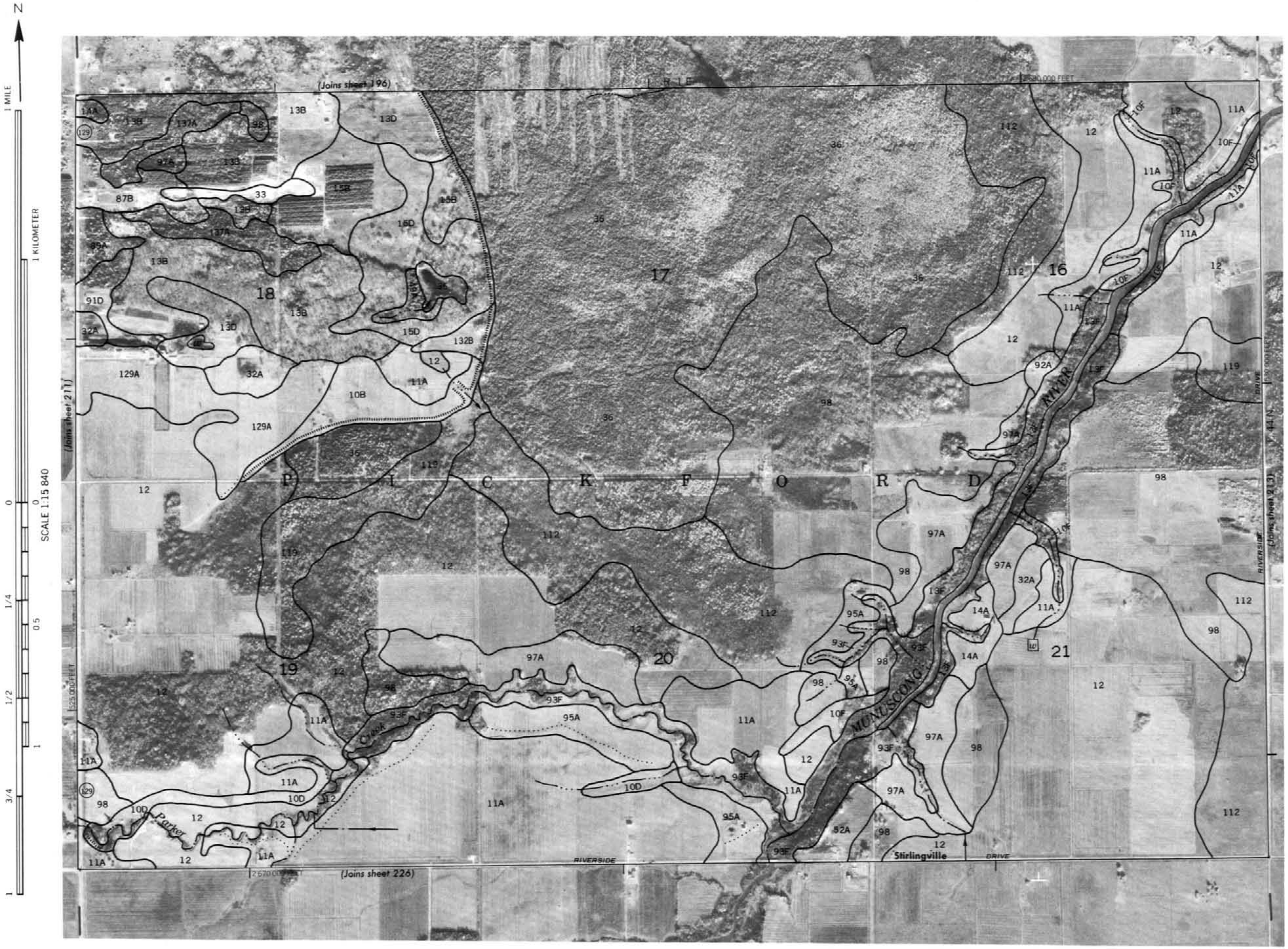
CHIPPEWA COUNTY, MICHIGAN NO. 211


N
(Joins sheet 195)
(Joins sheet 210)
(Joins sheet 212)
(Joins sheet 225)
R W
T 44 N
2 665 000 FEET
15
14
13
22
23
24
P I C K F O R D
Parker
Creek
Fletcher
water
Parker Creek
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
87B
137A
94A
36
119
12
11A
92A
14A
49A
98
15B
33
52A
129B
13B
89A
23
35
32A
129A
133
132B
145A
10B
44B
91E
91D
91B
48E
19E
68
6B

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 212


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 196)
(Joins sheet 211)
(Joins sheet 213)
(Joins sheet 226)
2 680 000 FEET
2 670 000 FEET
525 000 FEET
P I C K F O R D
MUNUSCONG RIVER
Parker Creek
Stirlingville
RIVERSIDE DRIVE
T. 44 N.
16
17
18
19
20
21
11A
12
13B
13D
14A
15B
15D
32A
33
36
87B
89A
91D
92A
93F
95A
97A
98
10B
10D
10F
112
119
129A
132B
137A

CHIPPEWA COUNTY, MICHIGAN NO. 212

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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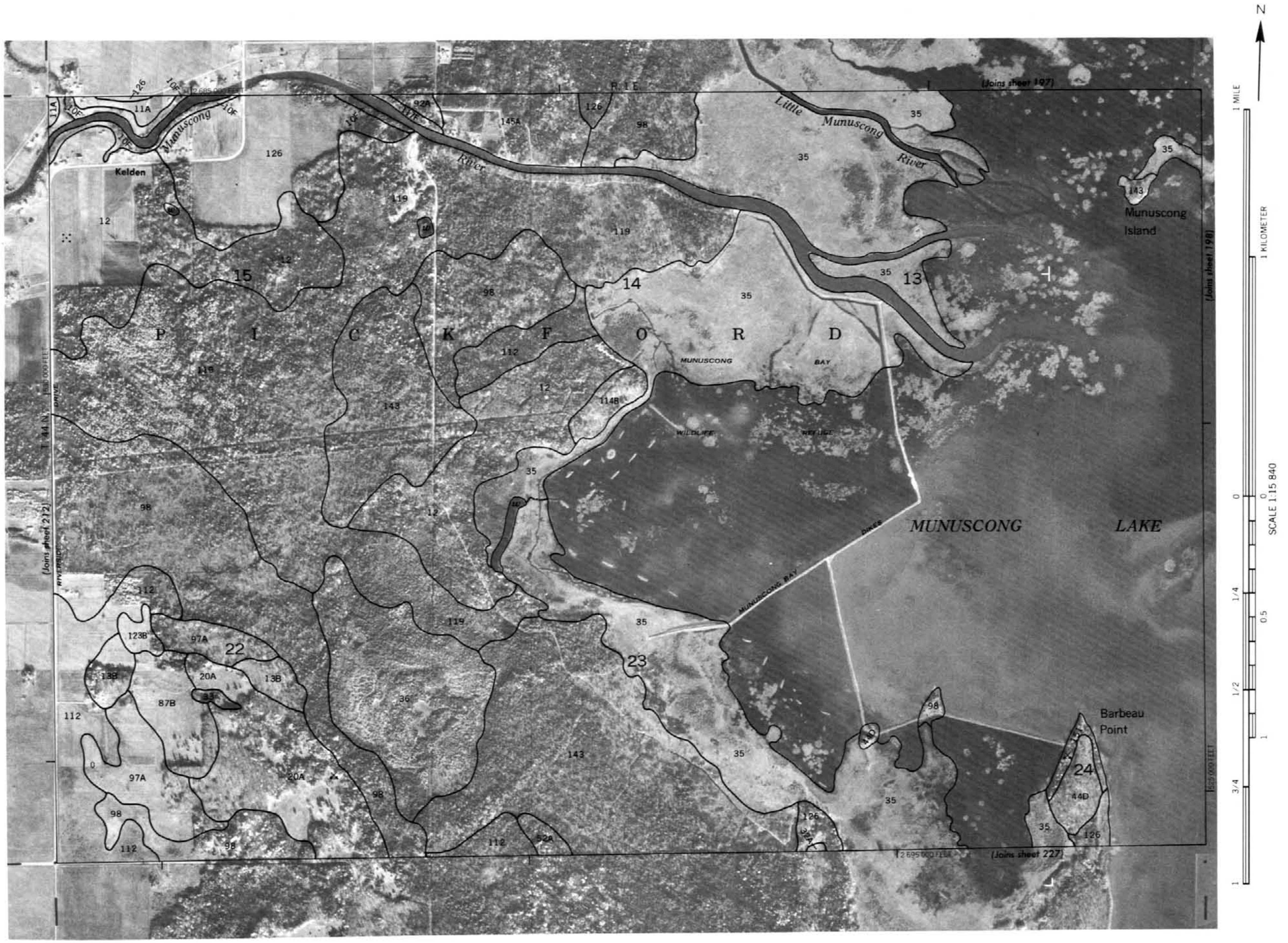
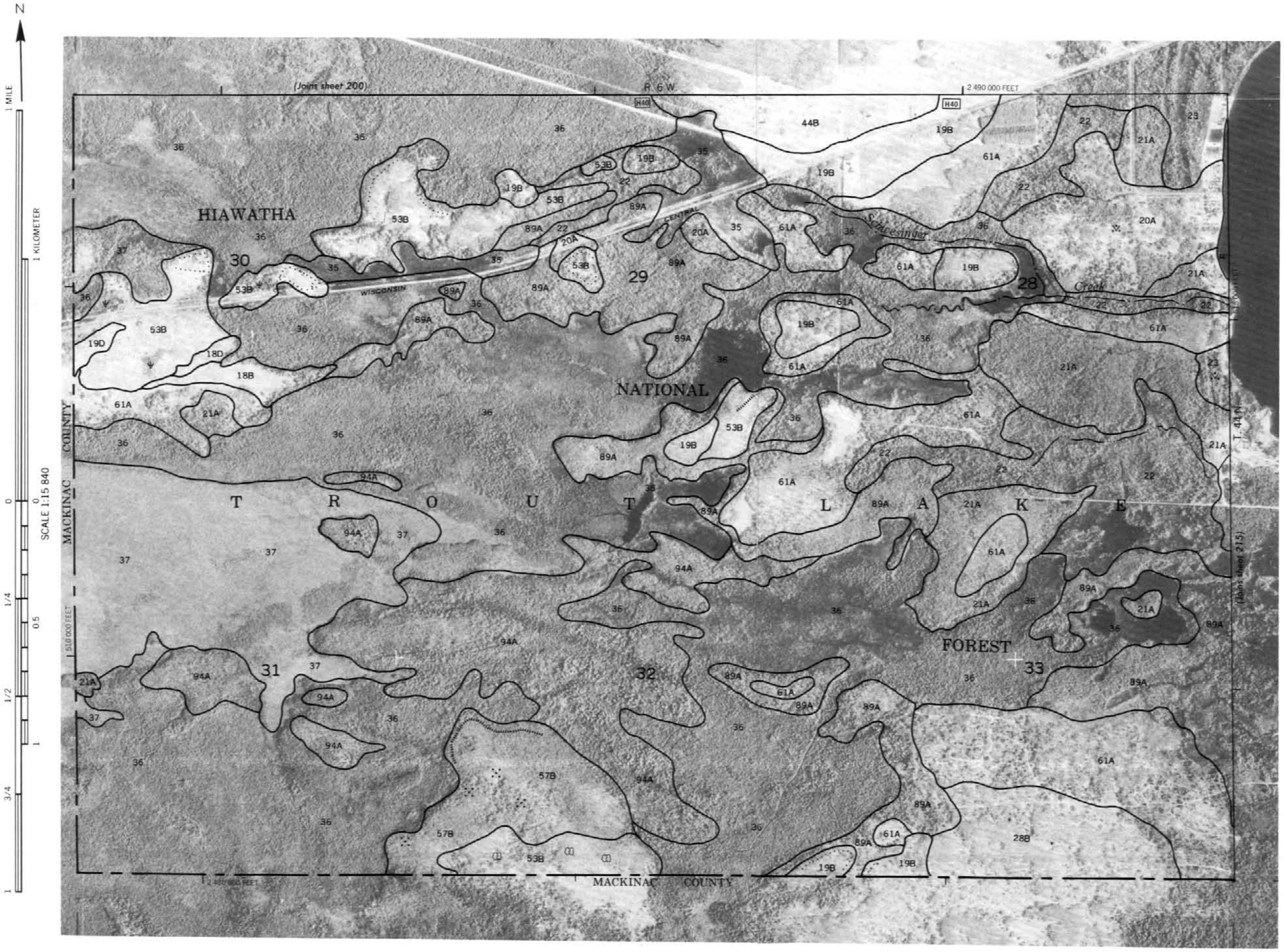
CHIPPEWA COUNTY, MICHIGAN NO. 213


N
(Joins sheet 197)
(Joins sheet 198)
(Joins sheet 212)
(Joins sheet 227)
R. 1 E.
T. 44 N.
RIVERSIDE DRIVE
Kelden
Munuscong River
Little Munuscong River
P I C K F O R D
MUNUSCONG BAY
WILDLIFE REFUGE
MUNUSCONG BAY DIKES
MUNUSCONG LAKE
Munuscong Island
Barbeau Point
13
14
15
22
23
24
11A
10F
126
92A
145A
98
35
143
12
119
112
114B
36
123B
97A
13B
20A
87B
33
52A
44D
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 214


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 200)
R 6 W
2 490 000 FEET
H40
HIAWATHA
NATIONAL
FOREST
T R O U T L A K E
MACKINAC COUNTY
510 000 FEET
2 480 000 FEET
(Joins sheet 215)
T. 44 N.
WISCONSIN CENTRAL
Schlesinger Creek
30
29
28
31
32
33
36
37
35
53B
19B
19D
18D
18B
22
20A
21A
23
44B
61A
89A
94A
57B
28B

CHIPPEWA COUNTY, MICHIGAN NO. 214

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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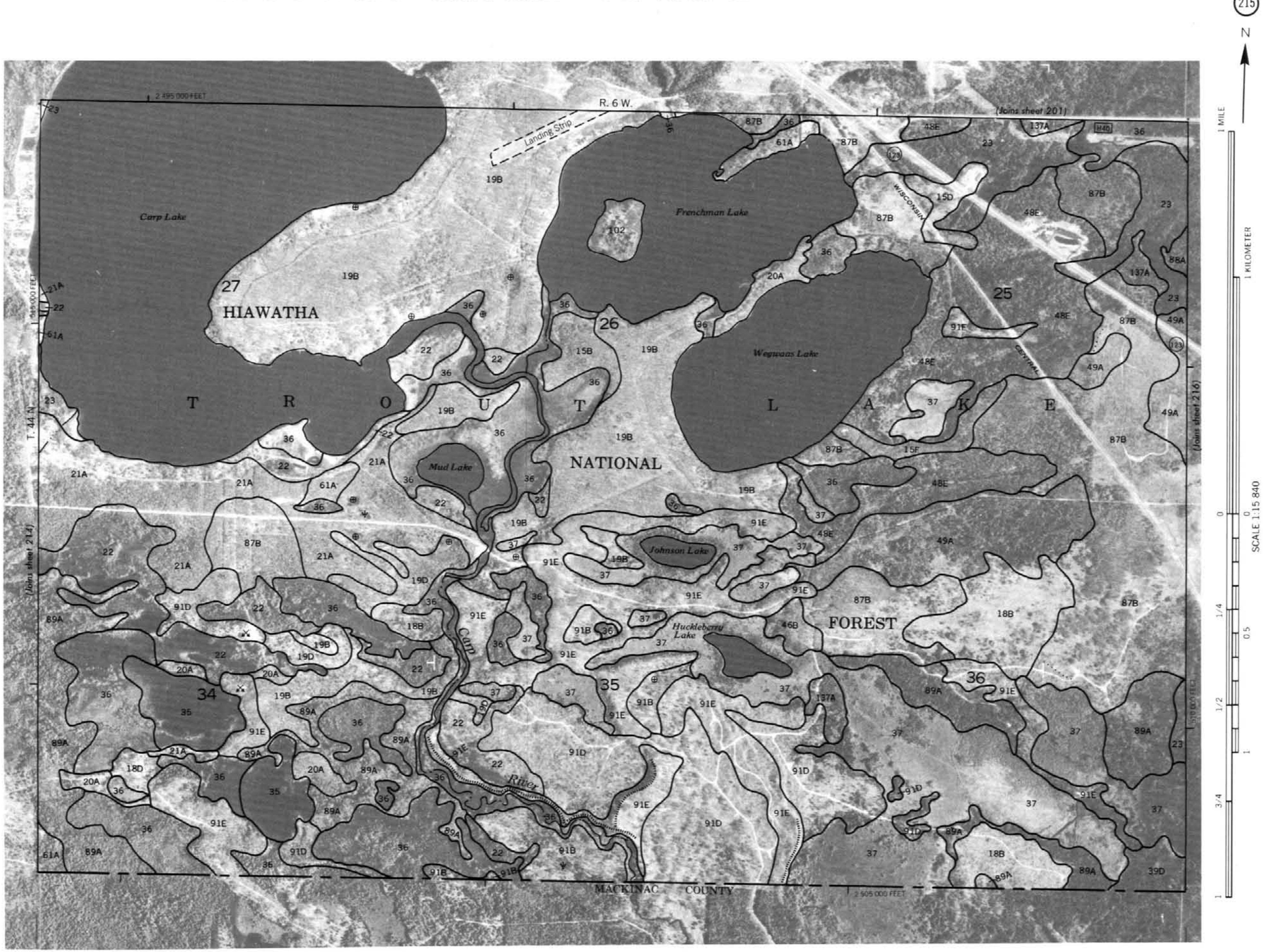
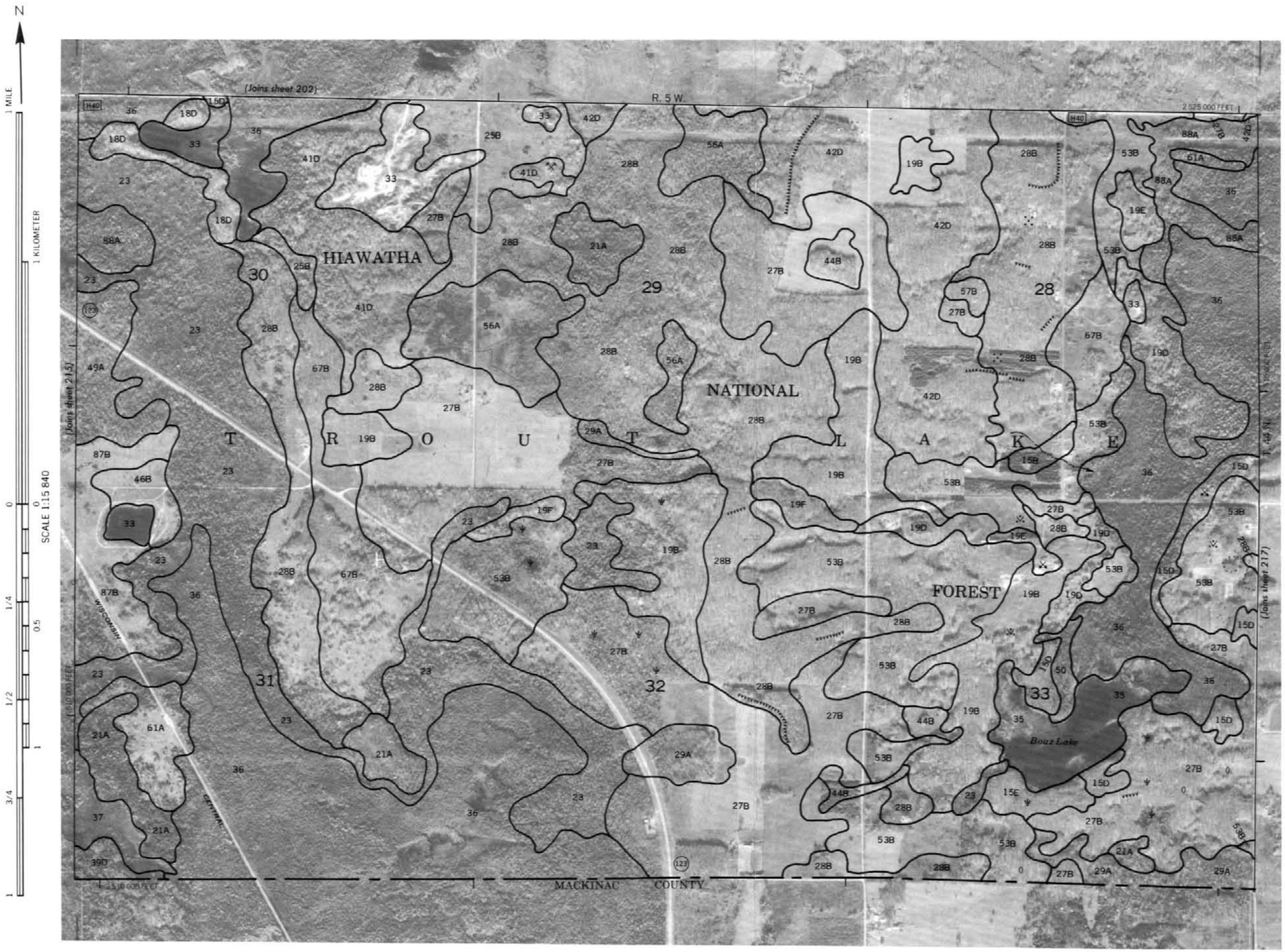
CHIPPEWA COUNTY, MICHIGAN NO. 215


215
N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
R. 6 W.
T. 44 N.
2 495 000 FEET
2 505 000 FEET
540 000 FEET
510 000 FEET
(Joins sheet 201)
(Joins sheet 214)
(Joins sheet 216)
Landing Strip
Carp Lake
Frenchman Lake
Wegwaas Lake
Mud Lake
Johnson Lake
Huckleberry Lake
Carp River
HIAWATHA
T R O U T
NATIONAL
L A K E
FOREST
MACKINAC COUNTY
WISCONSIN CENTRAL
H40
123
27
26
25
34
35
36
19B
22
21A
61A
36
23
15B
15D
15F
20A
87B
48E
137A
49A
88A
102
91E
91D
91B
37
18B
18D
19D
89A
35
46B
39D

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 216


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
(Joins sheet 202)
(Joins sheet 215)
(Joins sheet 217)
R. 5 W.
T. 44 N.
2 525 000 FEET
H40
123
HIAWATHA
NATIONAL
FOREST
T R O U T L A K E
29
30
31
32
28
33
Boaz Lake
MACKINAC COUNTY
WISCONSIN
CENTRAL
36
23
18D
15D
33
41D
25B
42D
56A
28B
27B
21A
19B
44B
57B
67B
49A
88A
87B
46B
61A
37
39D
29A
19F
19E
19D
53B
15B
15E
50
35

CHIPPEWA COUNTY, MICHIGAN NO. 216

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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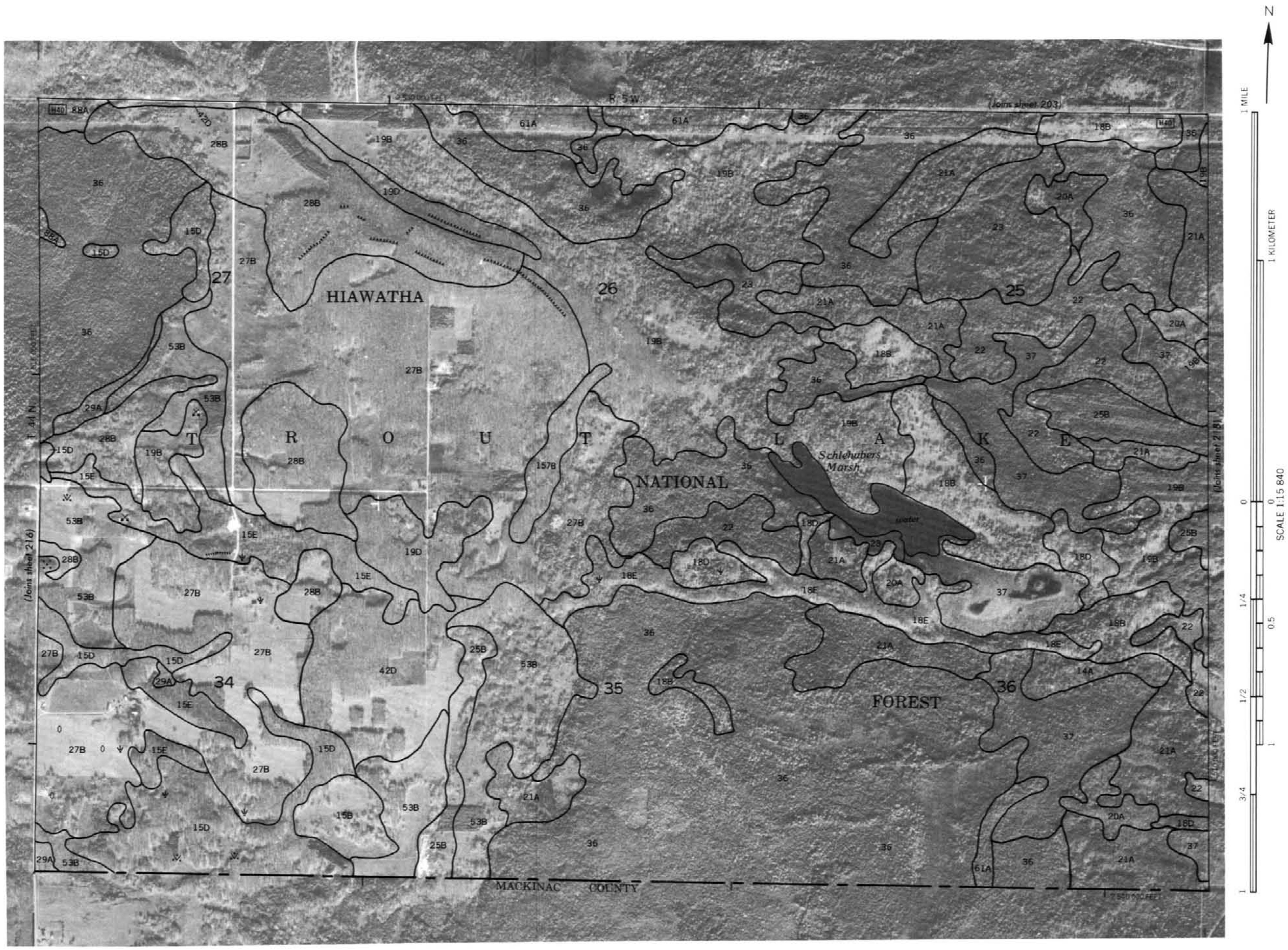
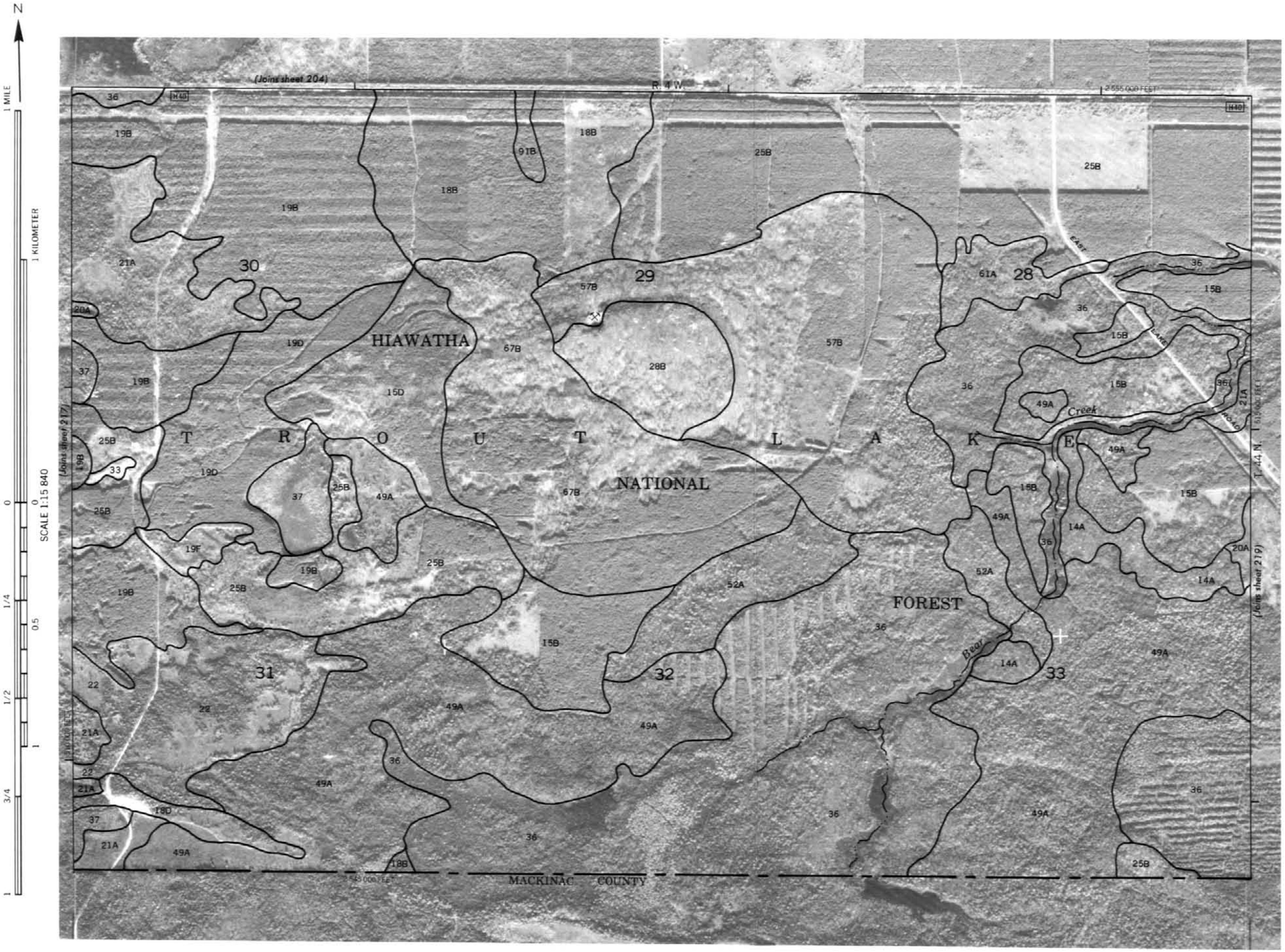
CHIPPEWA COUNTY, MICHIGAN NO. 217


N
R. 5 W.
T. 44 N.
(Joins sheet 203)
(Joins sheet 216)
(Joins sheet 218)
HIAWATHA
NATIONAL
FOREST
T R O U T L A K E
Schlehubers Marsh
water
MACKINAC COUNTY
26
27
25
34
35
36
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 218


N
1 MILE
1 KILOMETER
0
SCALE 1:15 840
1/4
0.5
1/2
1
3/4
1
(Joins sheet 204)
R. 4 W.
2 555 000 FEET
H40
H40
(Joins sheet 217)
(Joins sheet 219)
T. 44 N.
MACKINAC COUNTY
HIAWATHA
T R O U T L A K E
NATIONAL
FOREST
EAST LAKE ROAD
Creek
Bear
30
29
28
31
32
33
36
19B
18B
91B
25B
25B
19B
21A
20A
19D
57B
67B
28B
57B
61A
36
15B
15B
15B
36
49A
36
21A
37
19B
15D
25B
19B
33
19D
37
25B
49A
67B
49A
15B
15B
49A
36
14A
25B
19F
19B
25B
52A
52A
20A
14A
19B
15B
36
49A
14A
22
22
21A
49A
49A
36
36
22
21A
18D
37
21A
49A
18B
36
36
49A
36
25B

CHIPPEWA COUNTY, MICHIGAN NO. 218

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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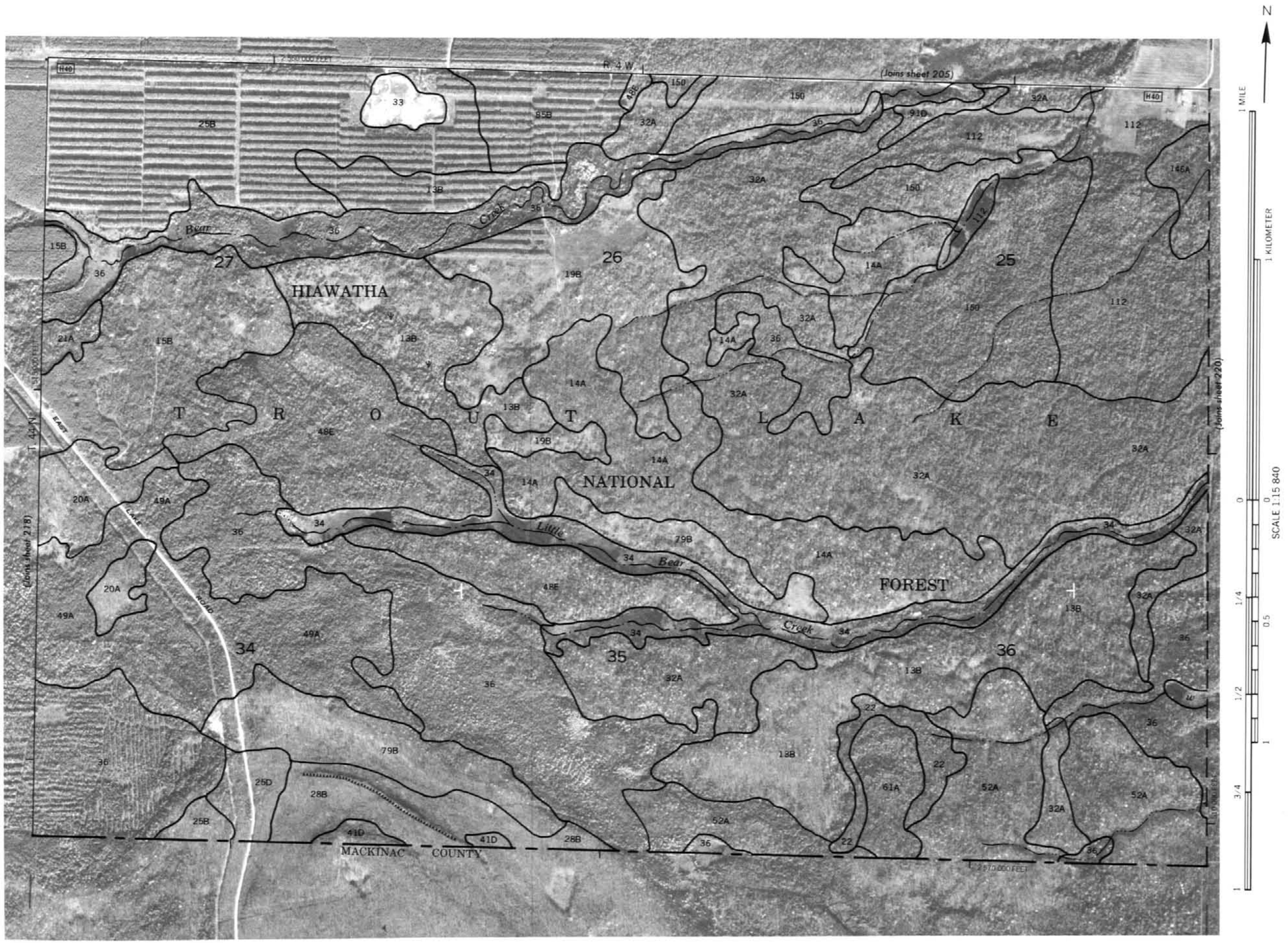
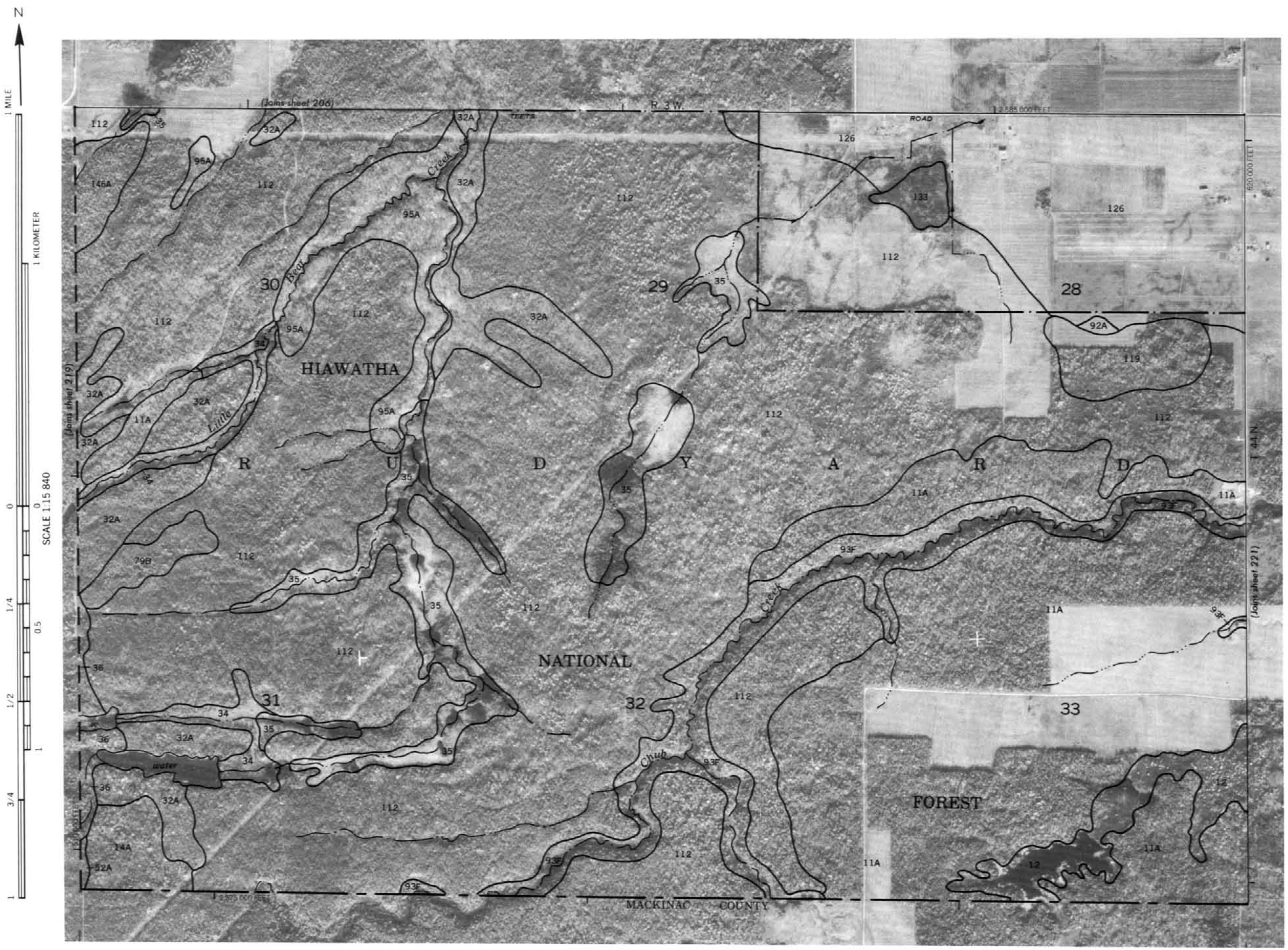
CHIPPEWA COUNTY, MICHIGAN NO. 219


(Joins sheet 205)
(Joins sheet 220)
(Joins sheet 218)
R. 4 W.
T. 42 N.
H40
HIAWATHA
T R O U T
L A K E
NATIONAL
FOREST
MACKINAC COUNTY
EAST LAKE ROAD
Bear Creek
Little Bear Creek
27
26
25
34
35
36
33
25B
85B
48E
150
32A
91D
112
146A
13B
36
15B
21A
19B
14A
14A
34
20A
49A
79B
25D
28B
41D
22
61A
52A
W
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
N

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 220


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 206)
(Joins sheet 219)
(Joins sheet 221)
R. 3 W.
T. 44 N.
TEETS ROAD
2 585 000 FEET
520 000 FEET
2 575 000 FEET
HIAWATHA
NATIONAL
FOREST
R U D Y A R D
Bear Creek
Little Bear
Chub Creek
MACKINAC COUNTY
28
29
30
31
32
33
water
112
126
133
119
92A
32A
95A
14A
11A
34
35
36
79B
93F
12
52A

CHIPPEWA COUNTY, MICHIGAN NO. 220

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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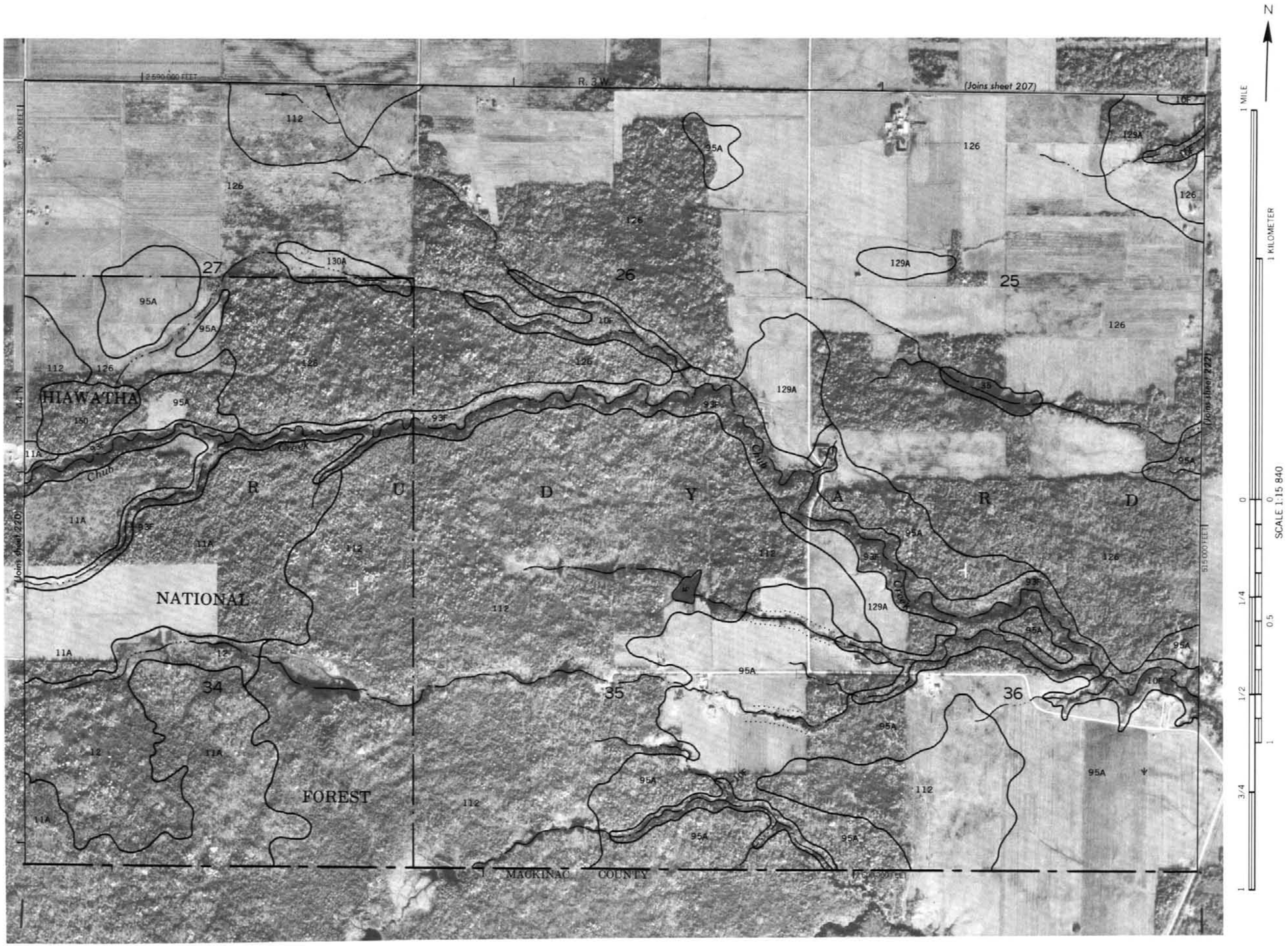
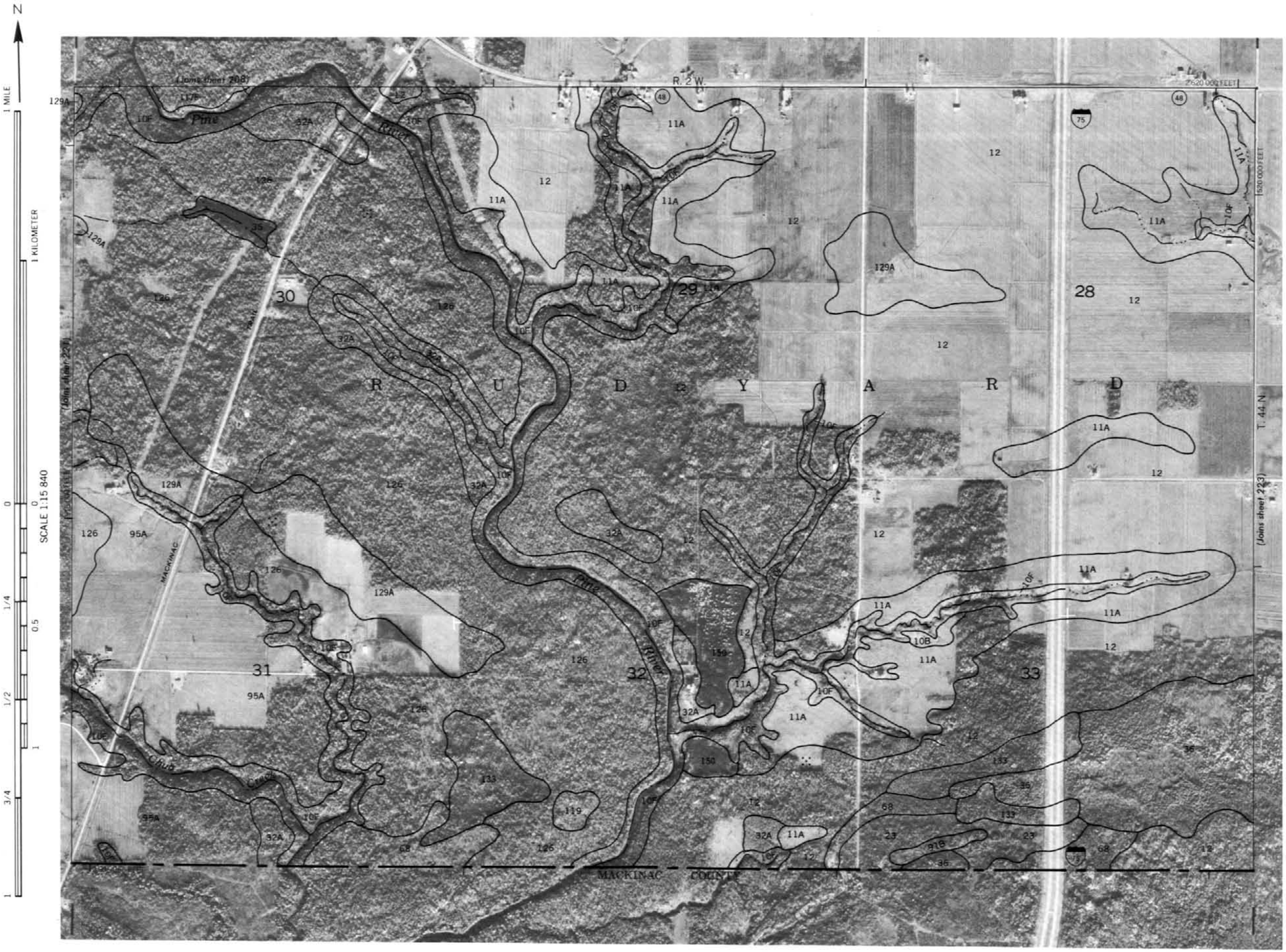
CHIPPEWA COUNTY, MICHIGAN NO. 221


N
R. 3 W.
2 590 000 FEET
(Joins sheet 207)
(Joins sheet 220)
(Joins sheet 222)
500 000 FEET
515 000 FEET
T. 44 N.
HIAWATHA
NATIONAL
FOREST
R U D Y A R D
MACKINAC COUNTY
Chub Creek
27
26
25
34
35
36
112
126
95A
130A
129A
10F
93F
11A
12
150
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 222


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
R. 2 W.
T. 44 N.
2 620 000 FEET
520 000 FEET
(Joins sheet 208)
(Joins sheet 221)
(Joins sheet 223)
48
75
Pine River
Pine River
Club Creek
MACKINAC
MACKINAC COUNTY
R U D Y A R D
28
29
30
31
32
33
10B
10F
11A
12
23
32A
35
36
68
91B
95A
119
126
129A
133
150
159

CHIPPEWA COUNTY, MICHIGAN NO. 222

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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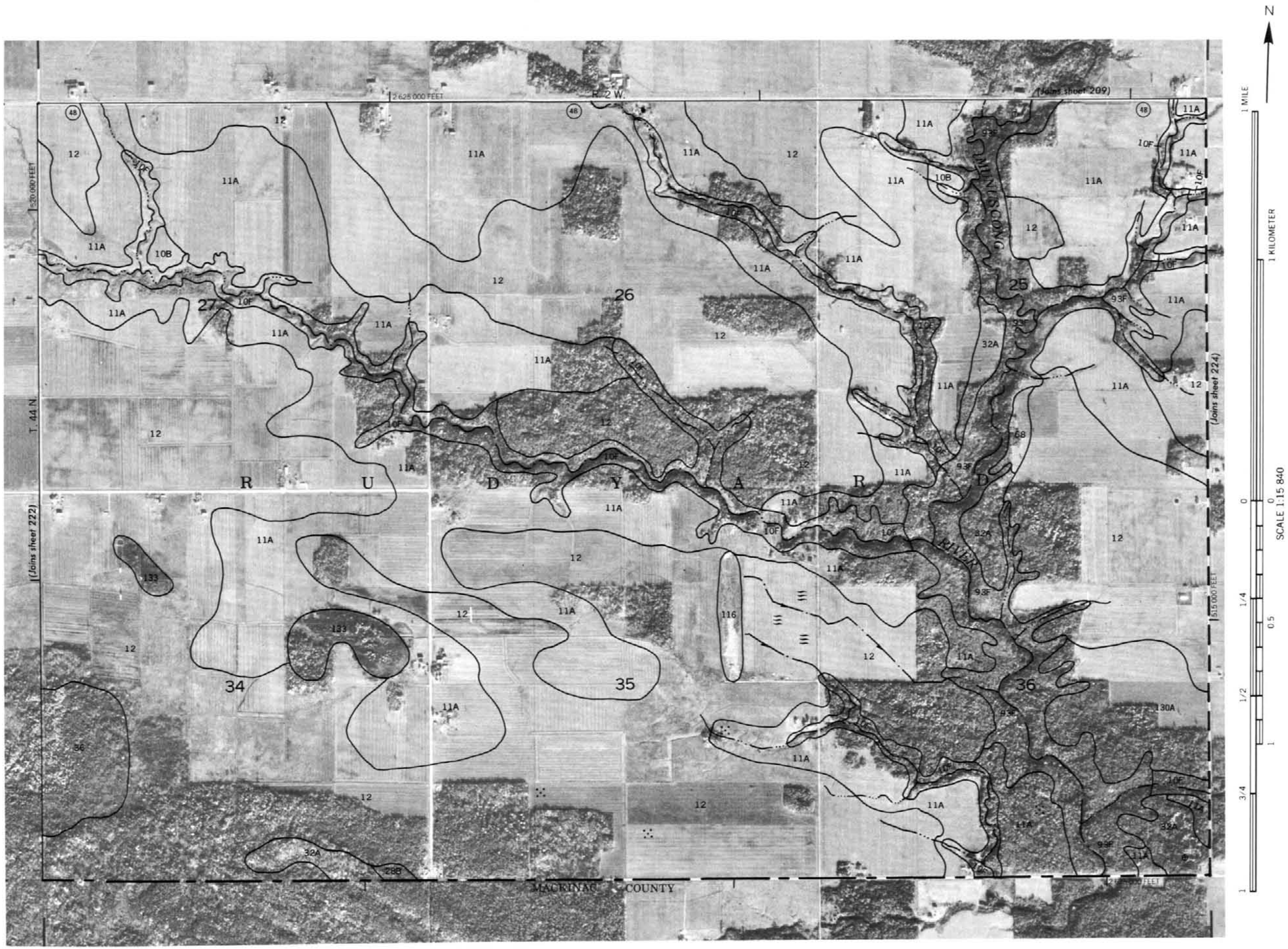
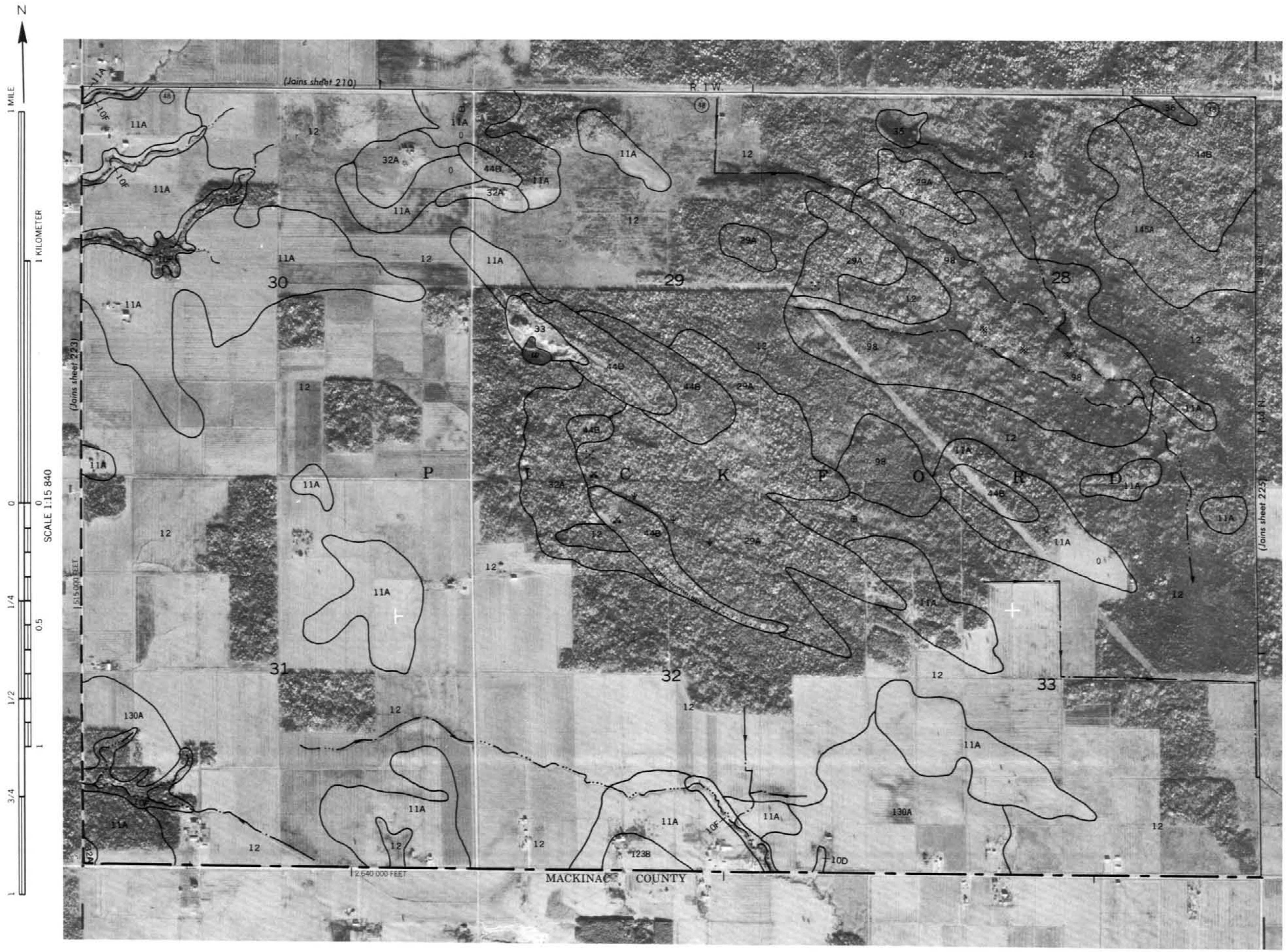
CHIPPEWA COUNTY, MICHIGAN NO. 223


N
(Joins sheet 209)
(Joins sheet 222)
(Joins sheet 224)
2 625 000 FEET
520 000 FEET
515 000 FEET
R. 2 W.
T. 44 N.
48
MACKINAC COUNTY
MUNUSCONG RIVER
R U D Y A R D
25
26
27
34
35
36
11A
12
10F
10B
93F
32A
68
116
133
130A
56
28B
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 224


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 210)
R 1 W
(Joins sheet 223)
(Joins sheet 225)
T 44 N
515 000 FEET
2 640 000 FEET
560 000 FEET
PICKFORD
MACKINAC COUNTY
28
29
30
31
32
33
11A
10F
12
32A
44B
33
29A
35
98
145A
130A
123B
10D

CHIPPEWA COUNTY, MICHIGAN NO. 224

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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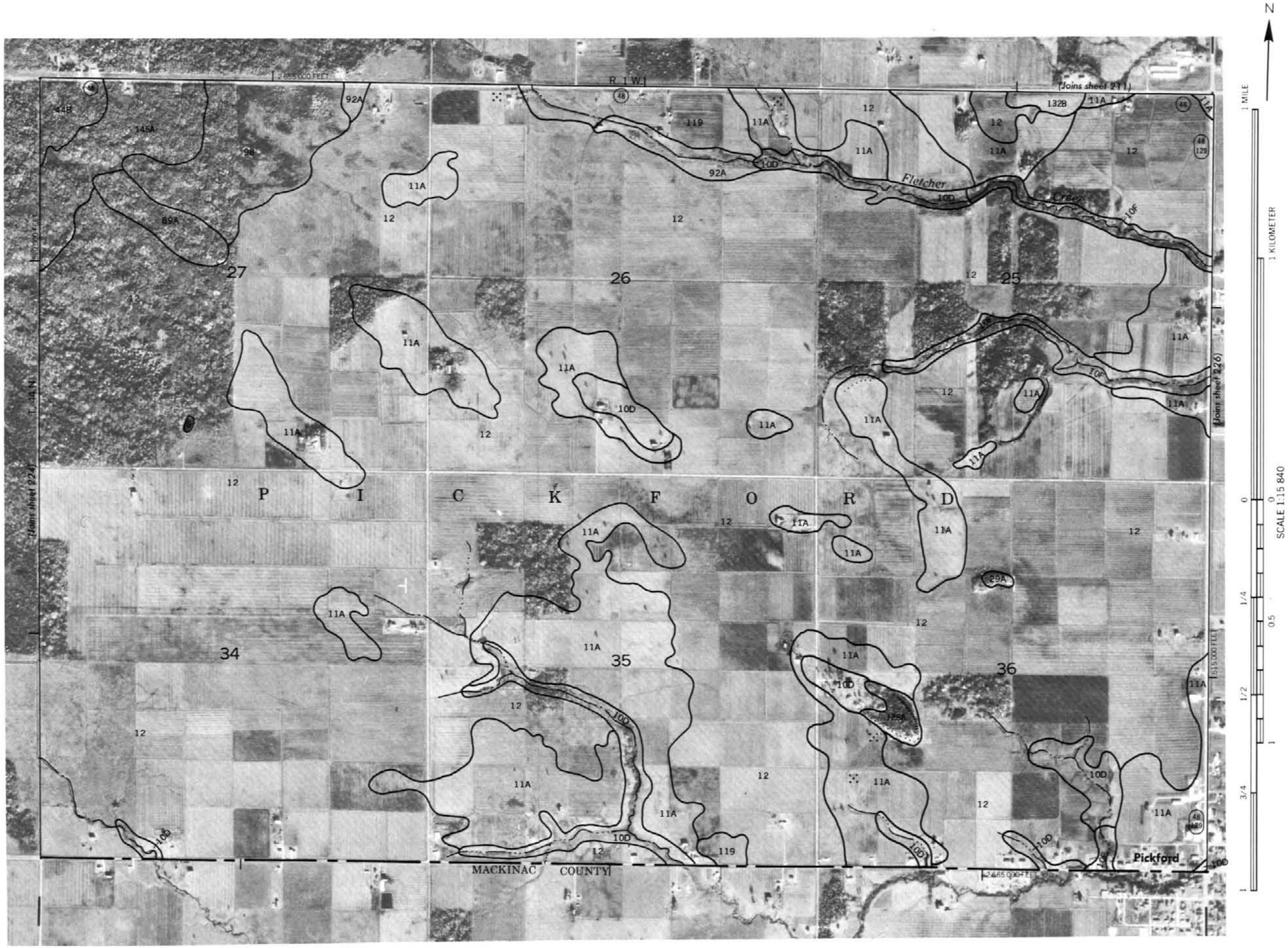
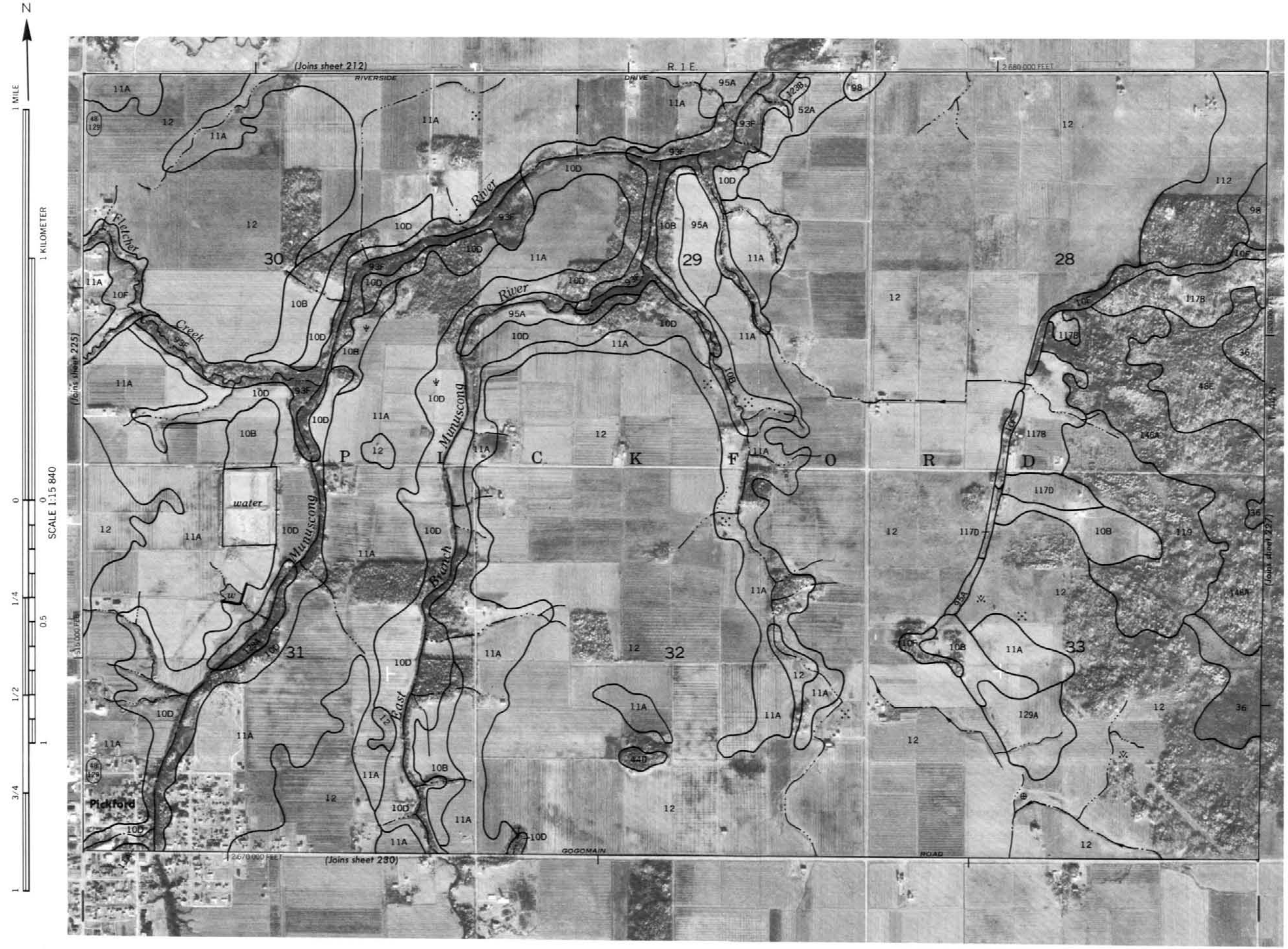
CHIPPEWA COUNTY, MICHIGAN NO. 225

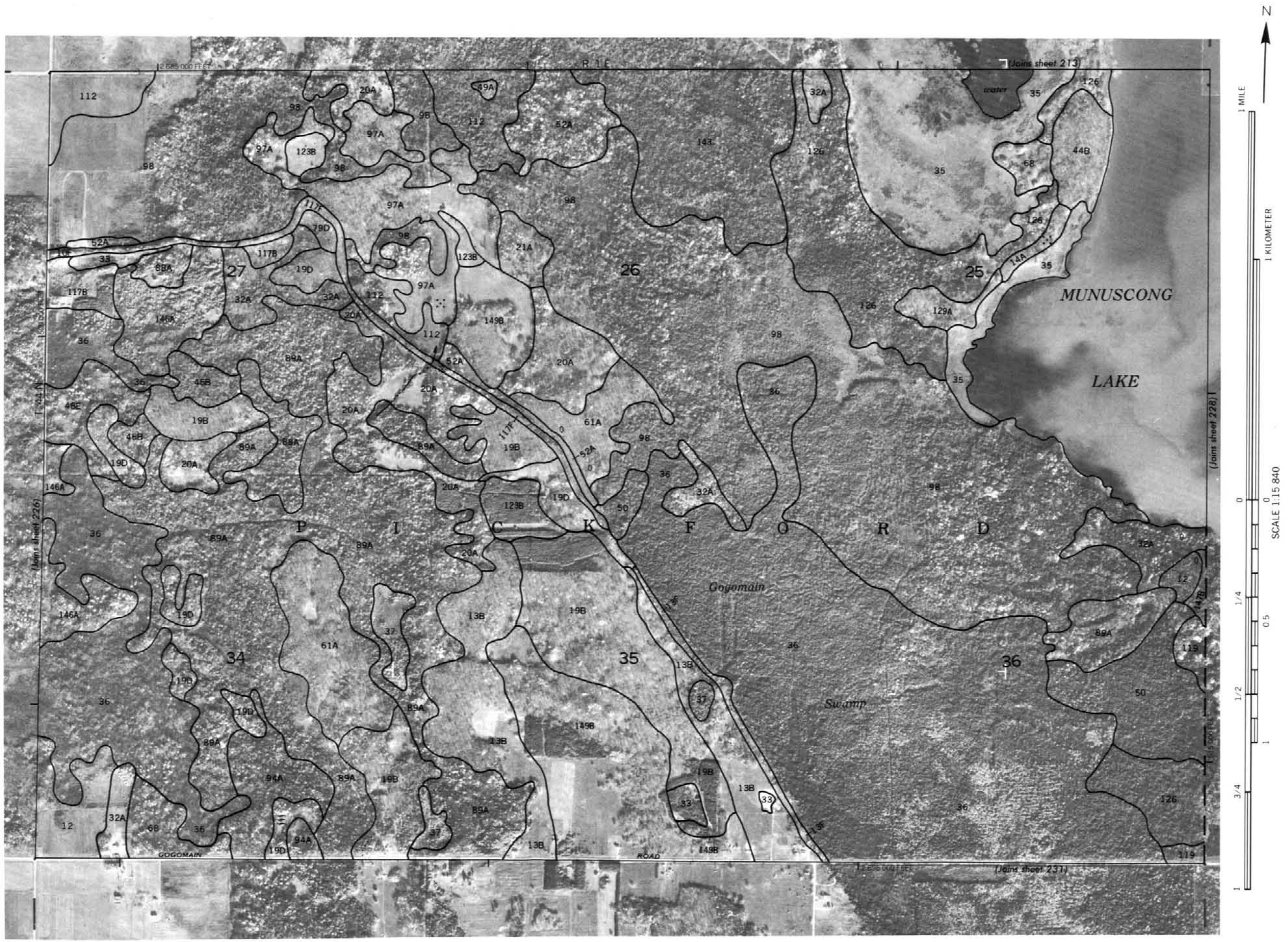

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
2 655 000 FEET
R. 1 W.
(Joins sheet 211)
(Joins sheet 226)
(Joins sheet 224)
T. 44 N.
515 000 FEET
27
26
25
34
35
36
P I C K F O R D
Fletcher Creek
MACKINAC COUNTY
Pickford
48
129
44B
145A
98
89A
92A
119
132B
11A
12
10D
10F
29A
125A

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 226


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 212)
R. 1 E.
2 680 000 FEET
RIVERSIDE
DRIVE
(Joins sheet 225)
(Joins sheet 227)
(Joins sheet 230)
2 670 000 FEET
GOGOMAIN
ROAD
T. 44 N.
530 000 FEET
P I C K F O R D
Pickford
Fletcher Creek
Munuscong River
Munuscong
East Branch Munuscong
water
w
28
29
30
31
32
33
11A
12
10D
10B
10F
93F
95A
123B
52A
98
112
117B
117D
48E
146A
36
129A
129
44D
48/129
65A

CHIPPEWA COUNTY, MICHIGAN NO. 226

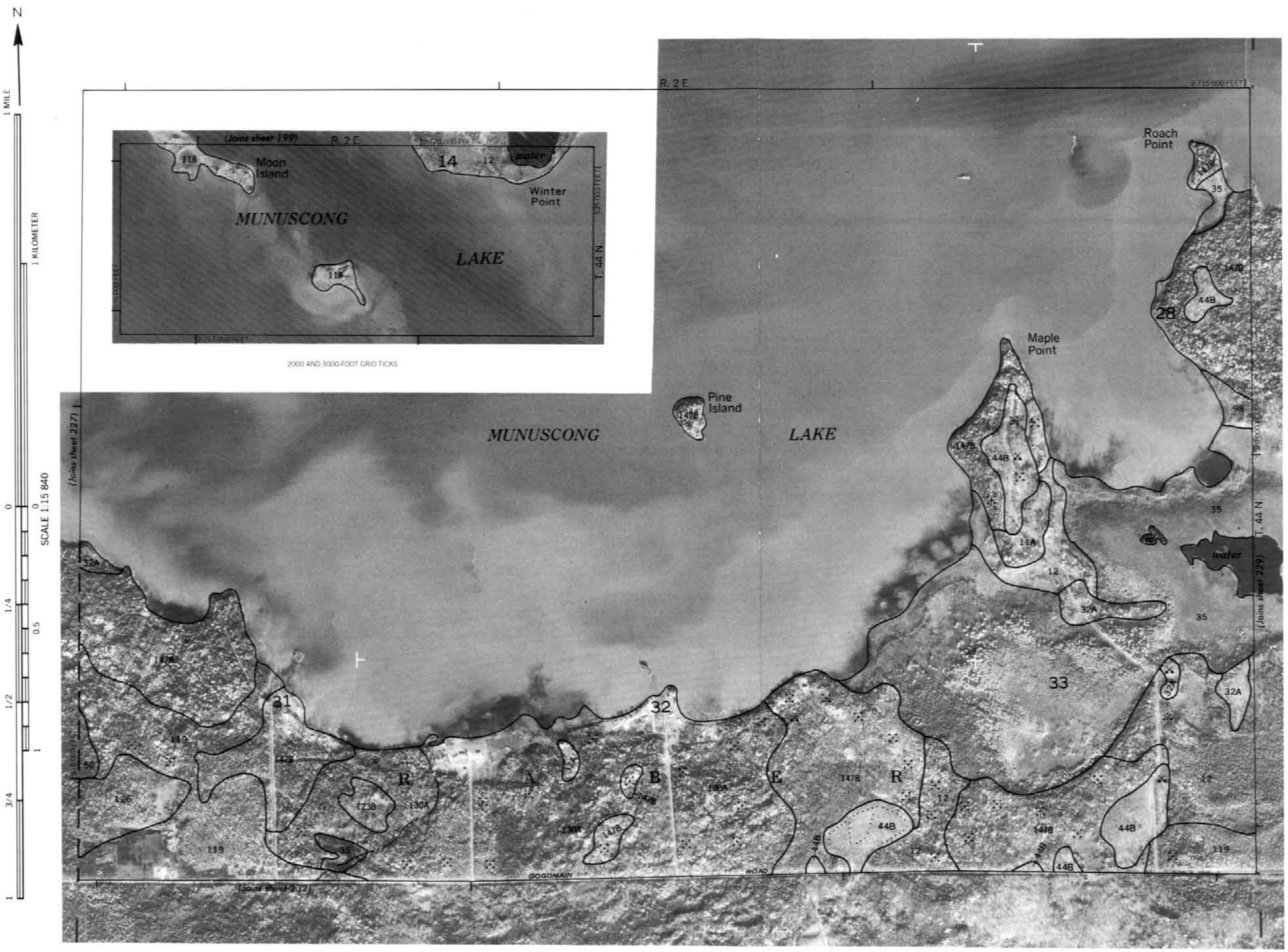
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
(Joins sheet 213)
R 1 E
2 685 000 FEET
MUNUSCONG
LAKE
water
(Joins sheet 228)
(Joins sheet 226)
(Joins sheet 231)
P I C K F O R D
Gogomain
Swamp
GOGOMAIN
ROAD
27
26
25
34
35
36
112
98
20A
49A
52A
143
32A
35
126
97A
123B
44B
58
117F
79D
21A
14A
52A
117B
88A
19D
32A
129A
146A
36
89A
46B
20A
46E
19B
61A
50
123B
13B
37
149B
94A
12
68
33
119
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 227

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 228


N
1 MILE
0
1/4
1/2
3/4
1
1 KILOMETER
0
0.5
1
SCALE 1:15 840
(Joins sheet 199)
R. 2 E.
118
Moon Island
14
12
water
Winter Point
MUNUSCONG
LAKE
118
T. 44 N.
R. 2 E.
Roach Point
147B
35
147B
44B
28
Maple Point
Pine Island
147B
MUNUSCONG
LAKE
98
147B
44B
11A
12
35
water
32A
35
33
32A
32A
T. 44 N.
(Joins sheet 229)
(Joins sheet 227)
32A
147B
31
119
50
126
147B
123B
130A
35
119
R
A
B
E
R
32
32A
147B
130A
130A
147B
44B
44B
12
147B
12
44B
147B
44B
12
119
GOGOMAIN ROAD
(Joins sheet 232)

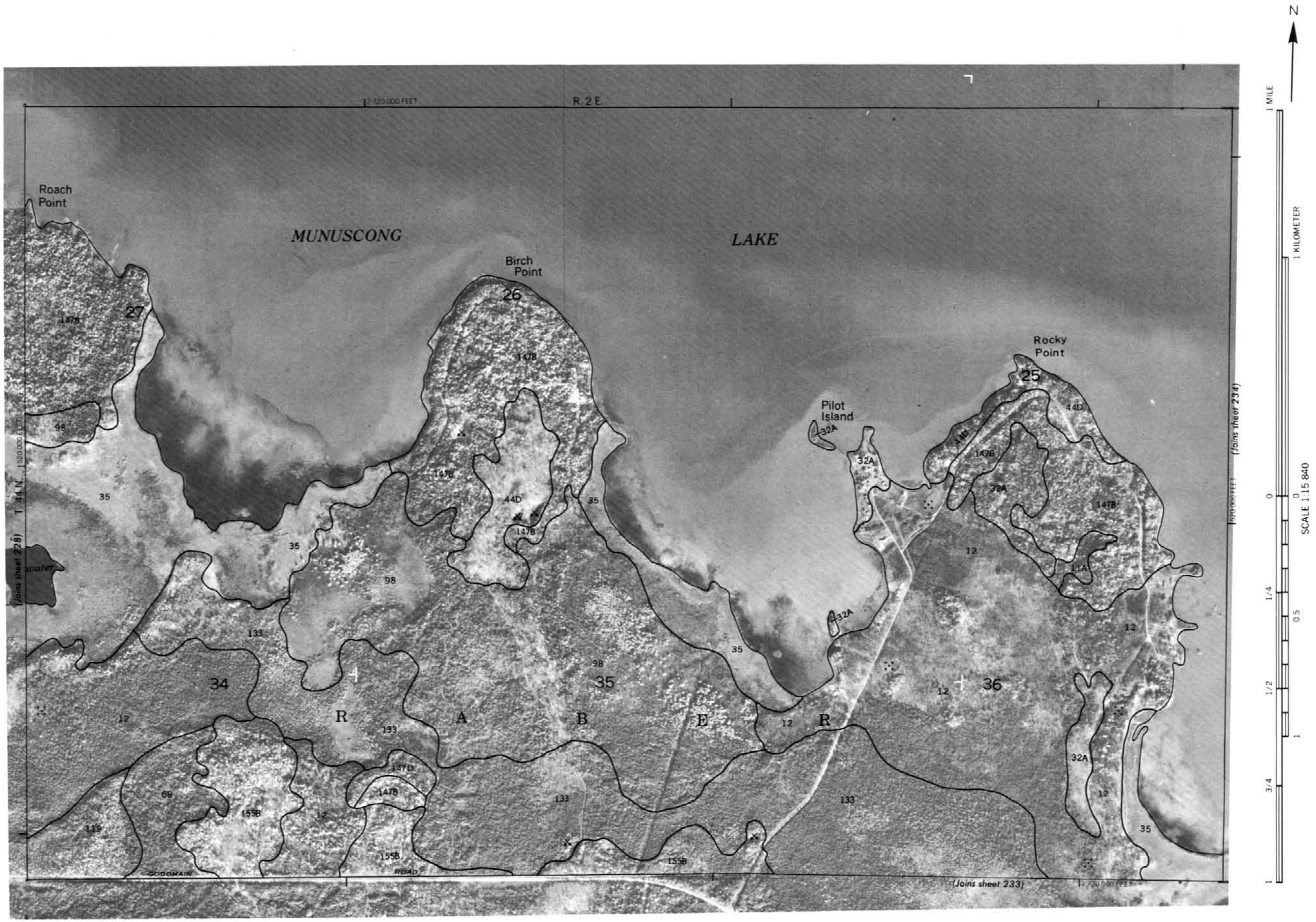
2000 AND 3000-FOOT GRID TICKS

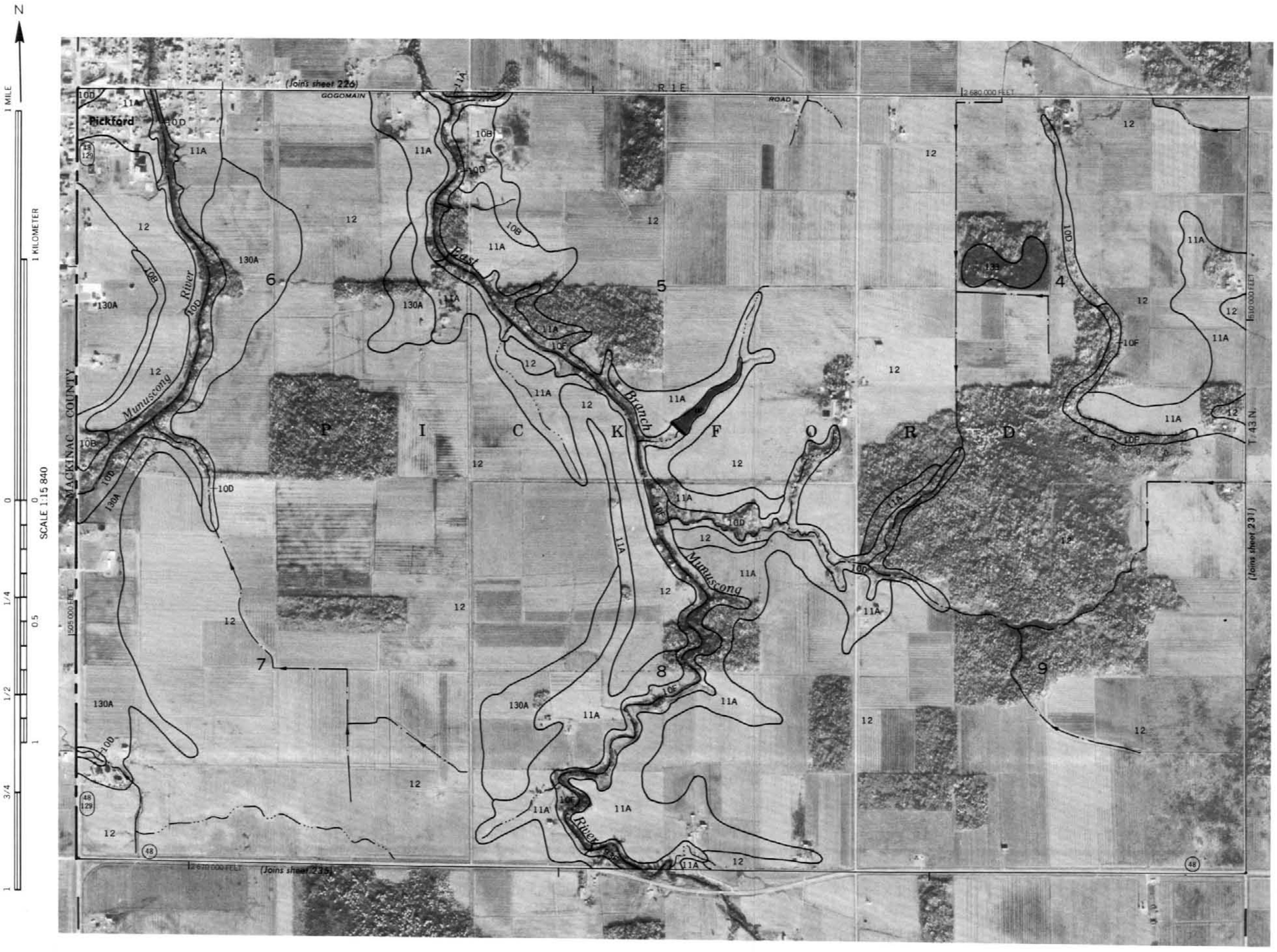
CHIPPEWA COUNTY, MICHIGAN NO. 228

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 229


N
MUNUSCONG
LAKE
Roach Point
Birch Point
Rocky Point
Pilot Island
R. 2 E.
T. 44 N.
2 120 000 FEET
520 000 FEET
(Joins sheet 228)
(Joins sheet 234)
(Joins sheet 233)
water
GOGOMAIN
ROAD
R A B E R
27
26
25
34
35
36
147B
98
35
133
12
44D
32A
11A
68
119
155B
147D
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 226)
GOGOMAIN
ROAD
R 1 E
2 680 000 FEET
Pickford
MACKINAC COUNTY
P I C K F O R D
T 43 N.
510 000 FEET
505 000 FEET
2 670 000 FEET
(Joins sheet 235)
(Joins sheet 231)
Munuscong River
East Branch Munuscong River
4
5
6
7
8
9
10B
10D
10F
11A
12
130A
133
48
129

CHIPPEWA COUNTY, MICHIGAN NO. 230

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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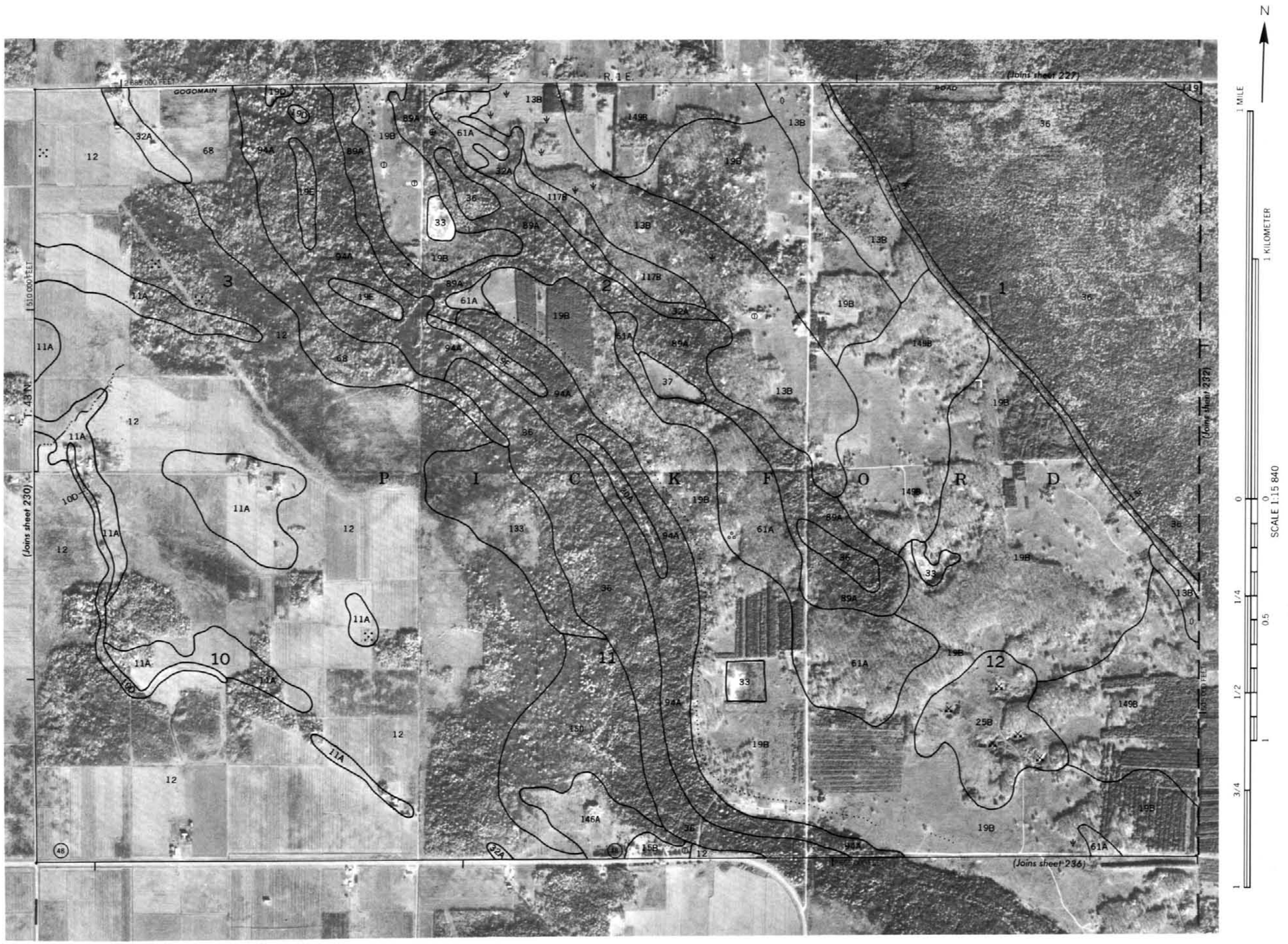
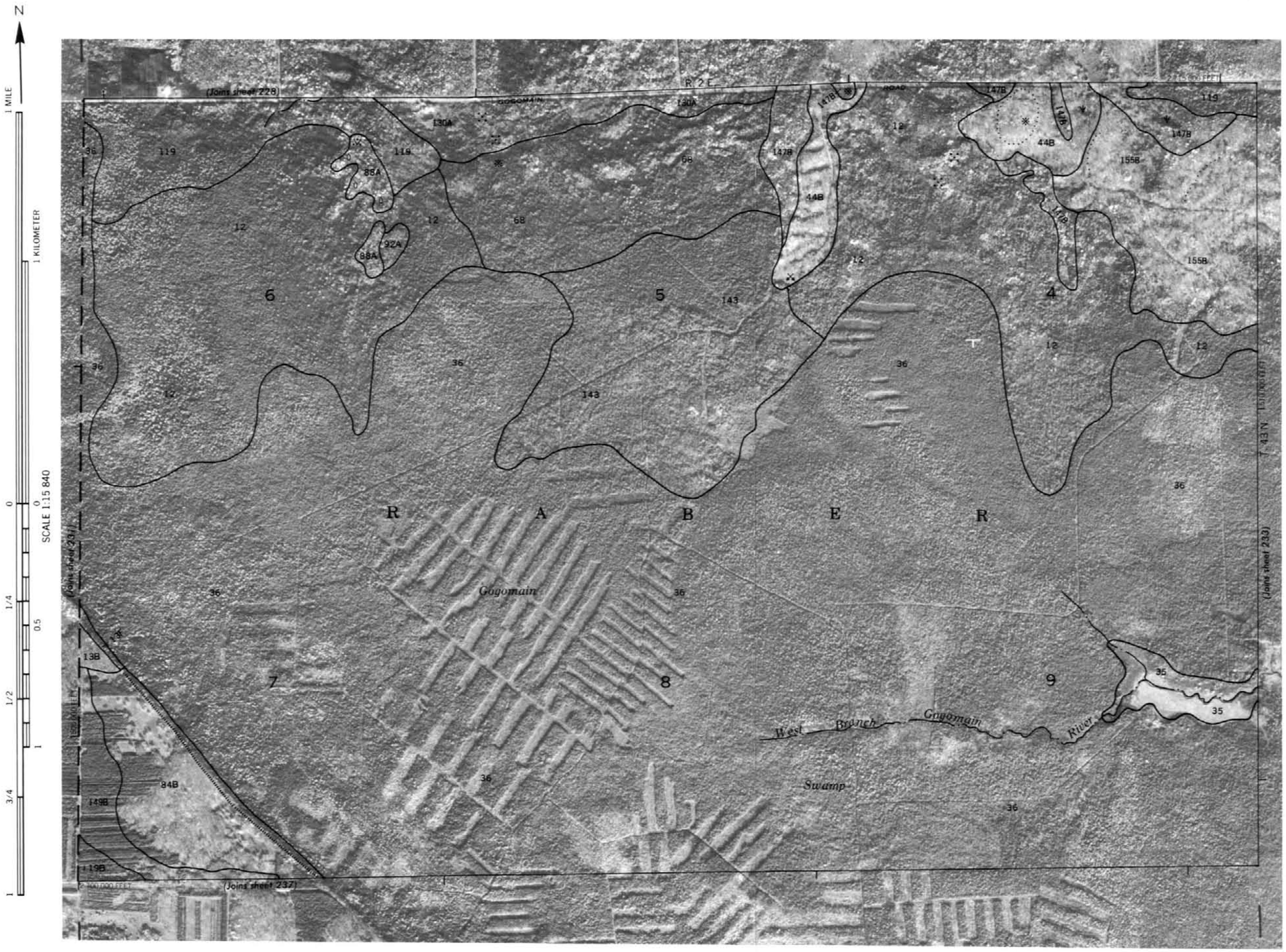
CHIPPEWA COUNTY, MICHIGAN NO. 231

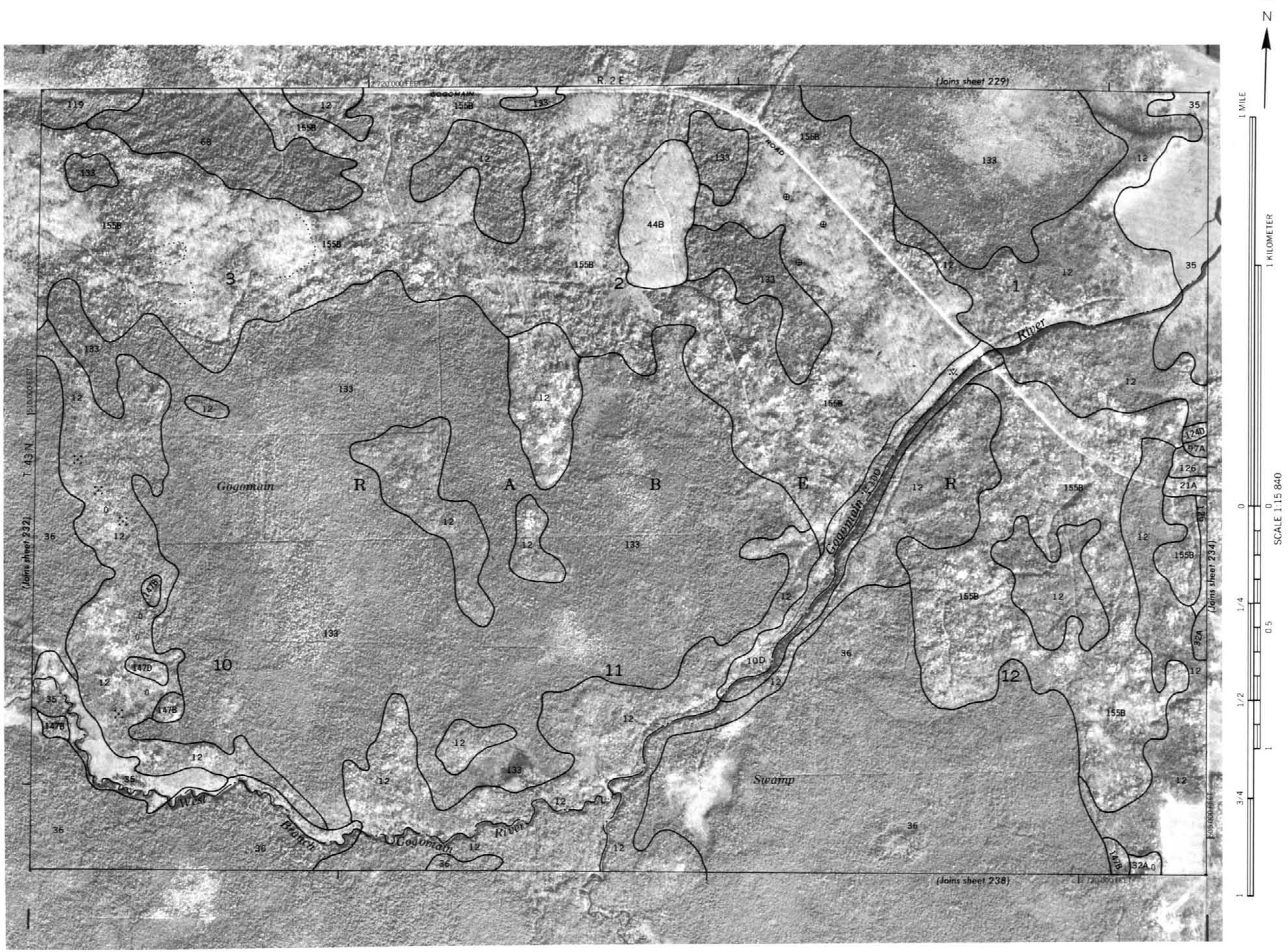

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
2 688 000 FEET
510 000 FEET
R. 1 E.
T. 43 N.
GOGOMAIN ROAD
(Joins sheet 227)
(Joins sheet 232)
(Joins sheet 236)
(Joins sheet 230)
P I C K F O R D
1
2
3
10
11
12
48
12
32A
68
94A
19D
19E
89A
19B
61A
13B
149B
32A
36
33
117B
11A
10D
133
37
146A
150
15B
25B
0

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 232


N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
SCALE 1:15 840
R 2 E
(Joins sheet 228)
GOGOMAIN ROAD
(Joins sheet 231)
(Joins sheet 233)
(Joins sheet 237)
T 43 N
119
36
12
6
5
4
7
8
9
88A
92A
118
130A
68
143
147B
44B
155B
36
35
13B
84B
149B
119B
R A B E R
Gogomain
West Branch Gogomain River
Swamp

CHIPPEWA COUNTY, MICHIGAN NO. 232

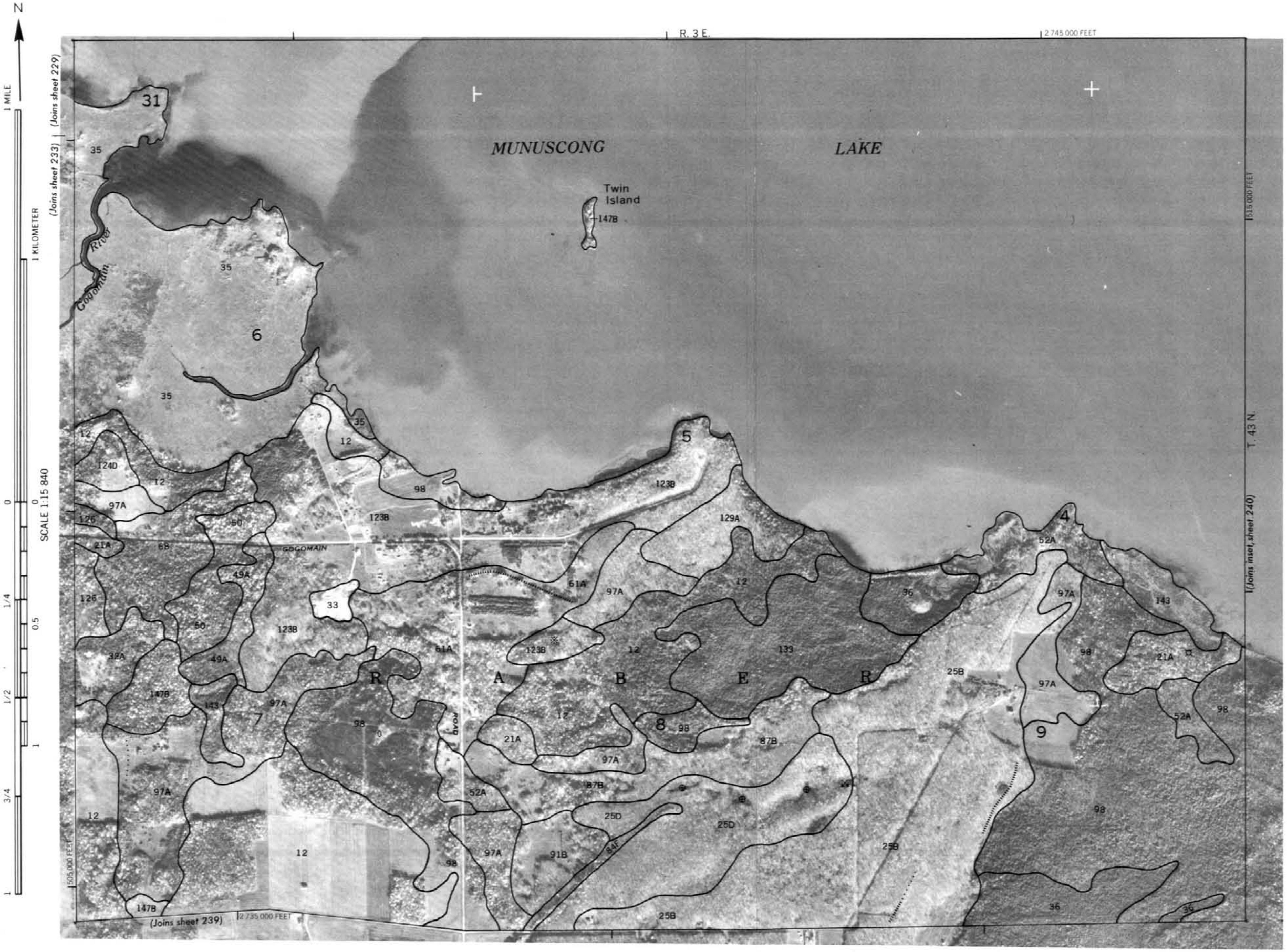
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


233
N
R. 2 E.
T. 43 N.
(Joins sheet 229)
(Joins sheet 232)
(Joins sheet 234)
(Joins sheet 238)
GOGOMAIN ROAD
Gogomain River
West Branch Gogomain River
Gogomain Swamp
R A B E R
1
2
3
10
11
12
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
119
68
155B
133
12
44B
35
36
147D
147B
10D
124D
97A
126
21A
32A

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 233

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 234

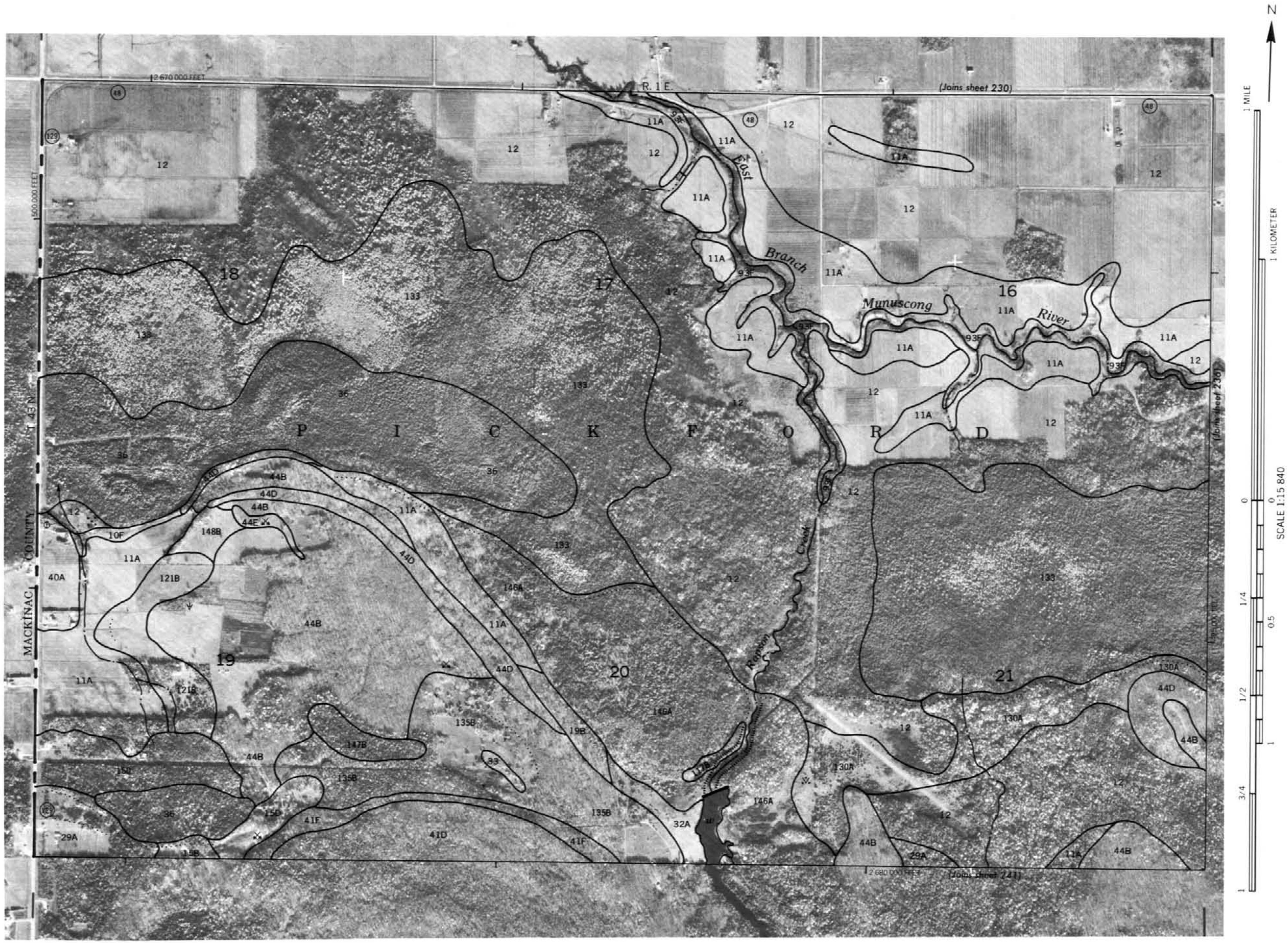

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 229)
(Joins sheet 233)
(Joins sheet 239)
(Joins inset, sheet 240)
R. 3 E.
T. 43 N.
2 745 000 FEET
2 735 000 FEET
515 000 FEET
505 000 FEET
MUNUSCONG
LAKE
Twin Island
147B
Gogomain River
GOGOMAIN
ROAD
R A B E R
31
35
6
12
124D
97A
126
21A
68
50
49A
33
123B
61A
32A
147B
143
7
98
5
129A
133
8
87B
52A
25D
25B
91B
84F
4
36
9

CHIPPEWA COUNTY, MICHIGAN NO. 234

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

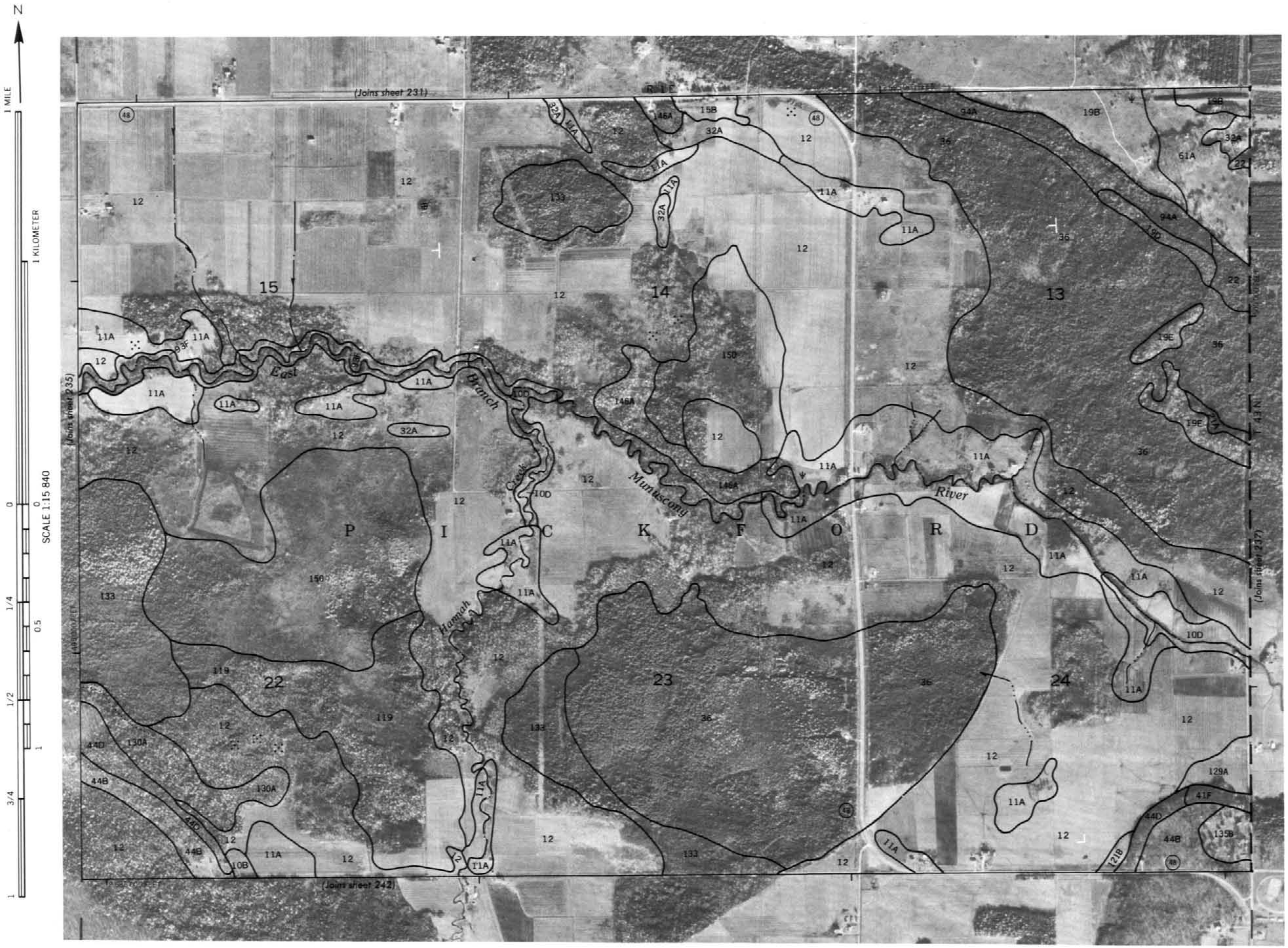
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 235


N
2 670 000 FEET
R. 1 E.
(Joins sheet 230)
(Joins sheet 236)
(Joins sheet 241)
2 680 000 FEET
500 000 FEET
T. 43 N.
MACKINAC COUNTY
PICKFORD
East Branch
Munuscong River
Rapson Creek
16
17
18
19
20
21
48
129
12
11A
93F
133
36
44B
44D
44E
10F
148B
40A
121B
146A
135B
147B
19B
33
15D
29A
41F
41D
32A
130A
44B
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

(236)

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 236


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 231)
(Joins sheet 235)
(Joins sheet 237)
(Joins sheet 242)
T. 43 N.
R. 1 E.
P I C K F O R D
15
14
13
22
23
24
East Branch
Munuscong River
Hannah Creek
12
11A
10D
10B
13B
15B
19B
19E
22
32A
36
41F
44B
44D
51A
94A
119
121B
129A
130A
133
135B
146A
150
48

CHIPPEWA COUNTY, MICHIGAN NO. 236

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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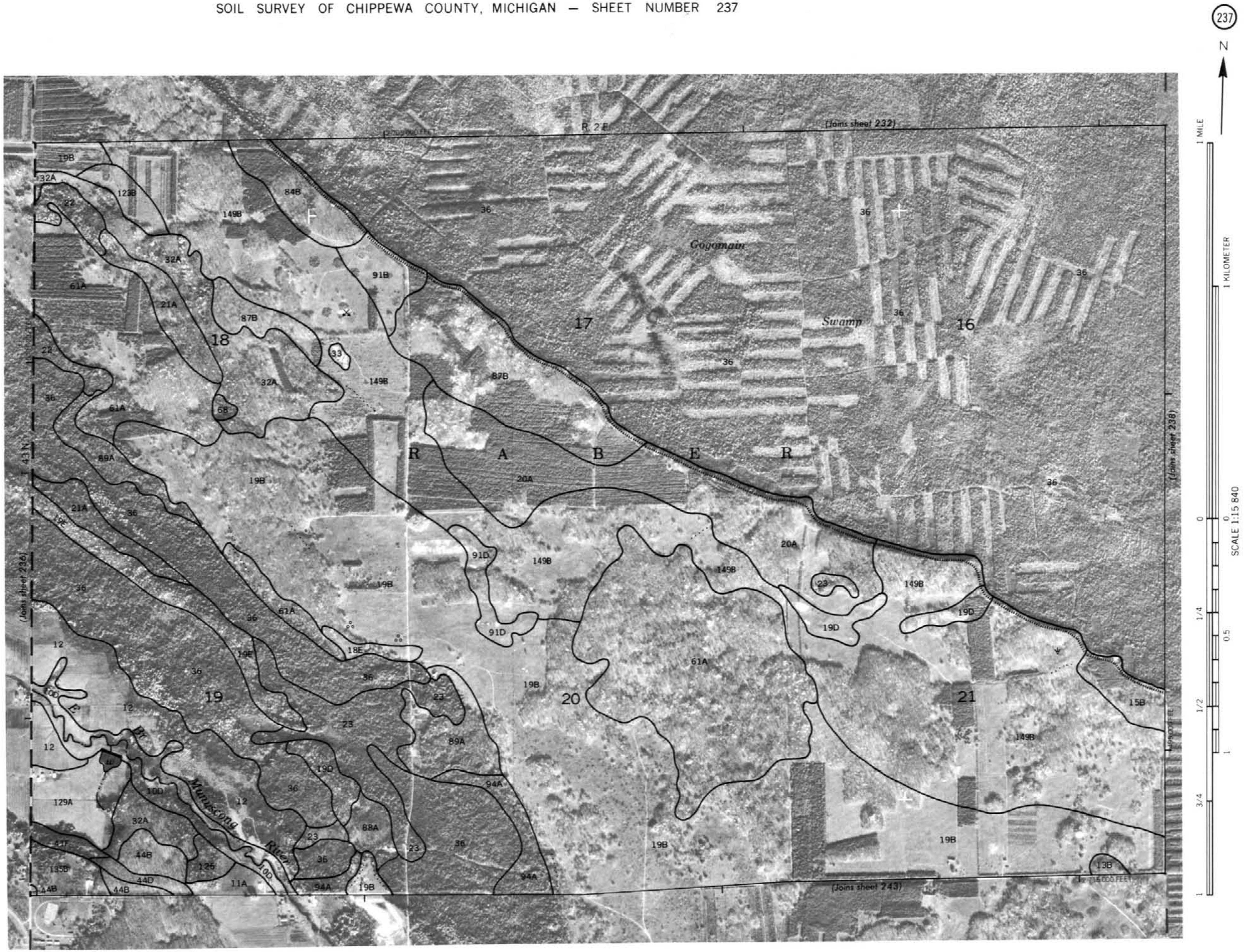
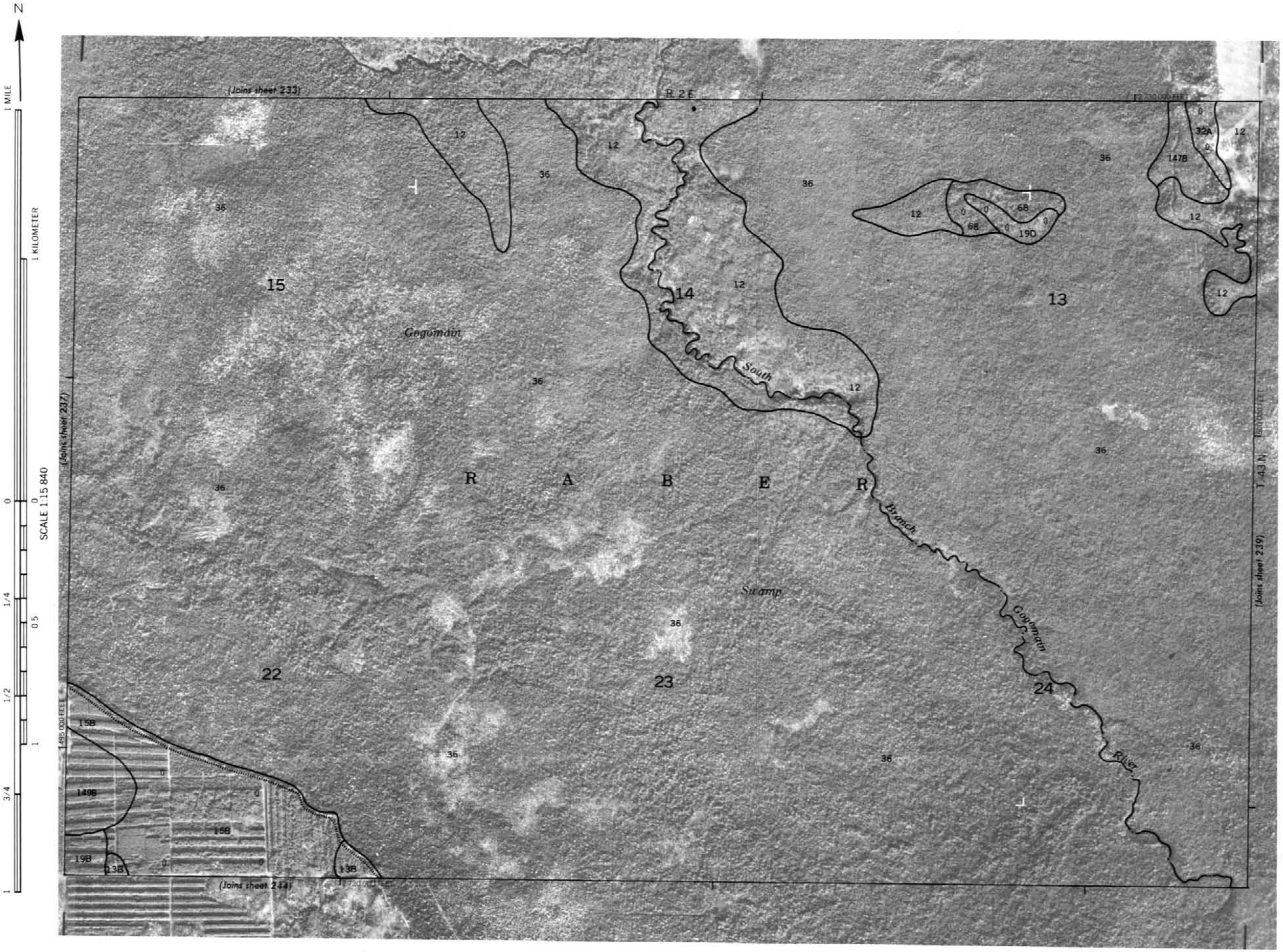
CHIPPEWA COUNTY, MICHIGAN NO. 237


237
N
(Joins sheet 232)
R. 2 E.
(Joins sheet 238)
(Joins sheet 243)
(Joins sheet 236)
T. 43 N.
Gogomain
Swamp
RABER
Munuscong River
17
16
18
19
20
21
19B
32A
22
123B
84B
149B
36
61A
21A
87B
91B
33
68
89A
20A
91D
19D
23
18E
19E
15B
12
129A
10D
44F
44B
44D
135B
126
11A
94A
88A
13B
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 238


N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
SCALE 1:15 840
(Joins sheet 233)
(Joins sheet 237)
(Joins sheet 239)
(Joins sheet 244)
R 2 E
T. 43 N.
12
36
15
14
13
22
23
24
32A
147B
68
19D
15B
149B
19B
13B
0
Gogomain
South
Branch
Gogomain
River
Swamp
R A B E R

CHIPPEWA COUNTY, MICHIGAN NO. 238

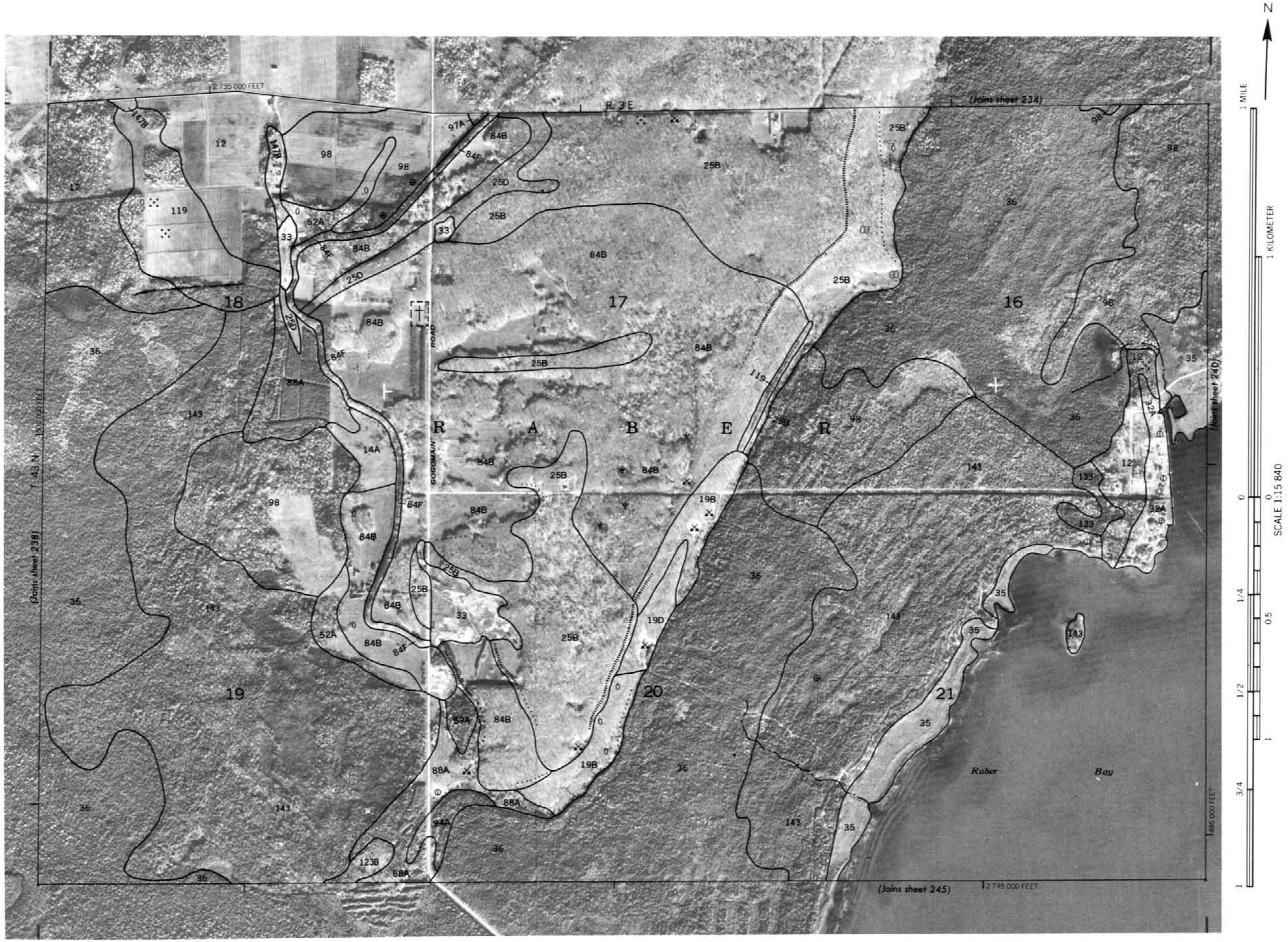
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 239

(239)

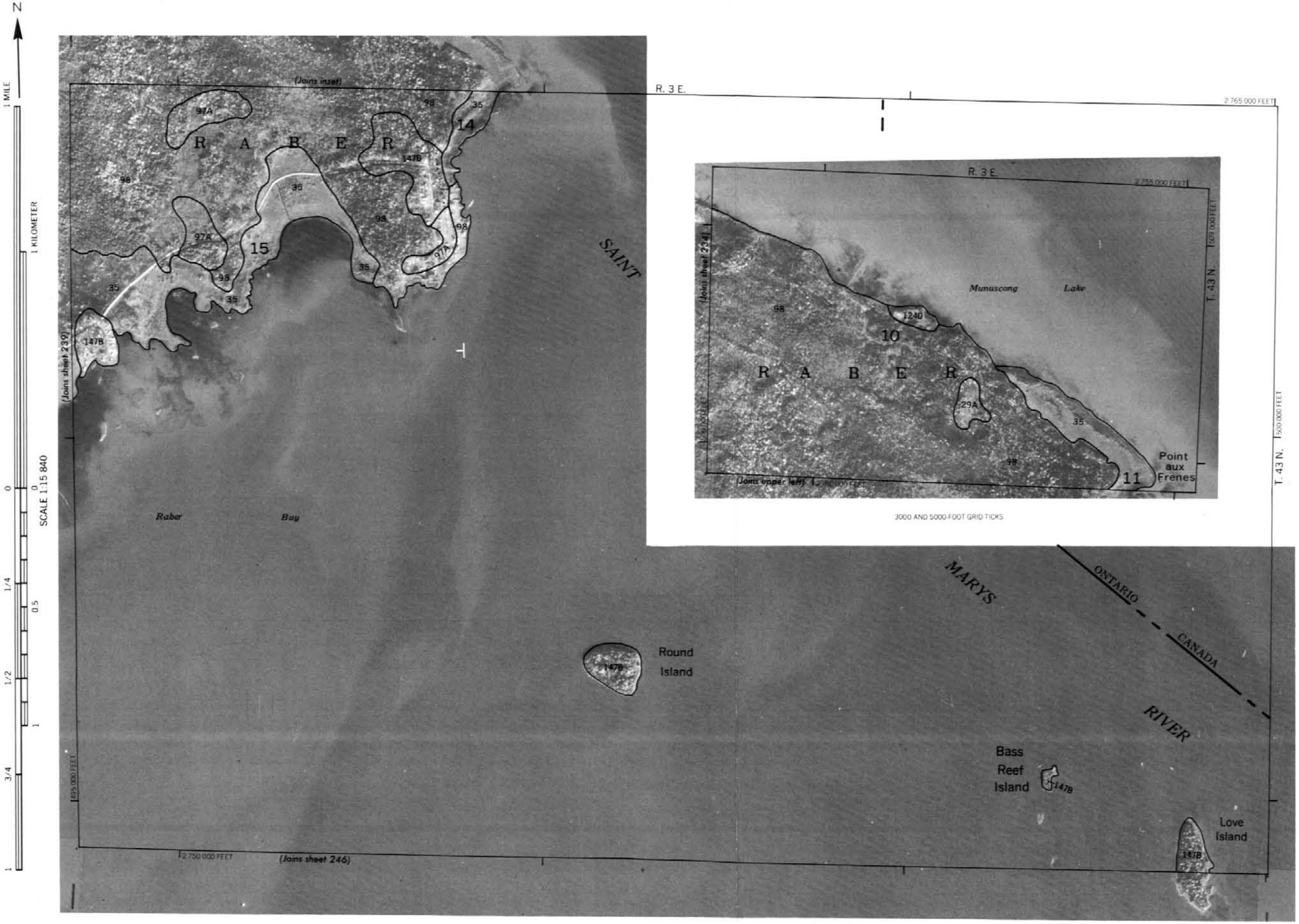
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 239


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
2 735 000 FEET
2 745 000 FEET
495 000 FEET
500 000 FEET
T. 43 N.
R. 3 E.
(Joins sheet 234)
(Joins sheet 238)
(Joins sheet 240)
(Joins sheet 245)
R A B E R
GOGOMAIN ROAD
Raber Bay
16
17
18
19
20
21
12
14A
19B
19D
25B
25D
32A
33
35
36
52A
84B
84F
88A
89A
97A
98
119
123B
133
143
147B

㉔⓪

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 240



N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins inset)
R. 3 E.
2 765 000 FEET
R A B E R
97A
98
35
14
147B
38
15
91A
(Joins sheet 239)
SAINT
MARYS
RIVER
ONTARIO
CANADA
Raber
Bay
Round
Island
Bass
Reef
Island
Love
Island
T. 43 N.
500 000 FEET
495 000 FEET
2 750 000 FEET
(Joins sheet 246)
R. 3 E.
2 755 000 FEET
505 000 FEET
(Joins sheet 234)
Munuscong
Lake
124D
10
29A
11
Point
aux
Frenes
(Joins upper left)
3000 AND 5000-FOOT GRID TICKS

CHIPPEWA COUNTY, MICHIGAN NO. 240

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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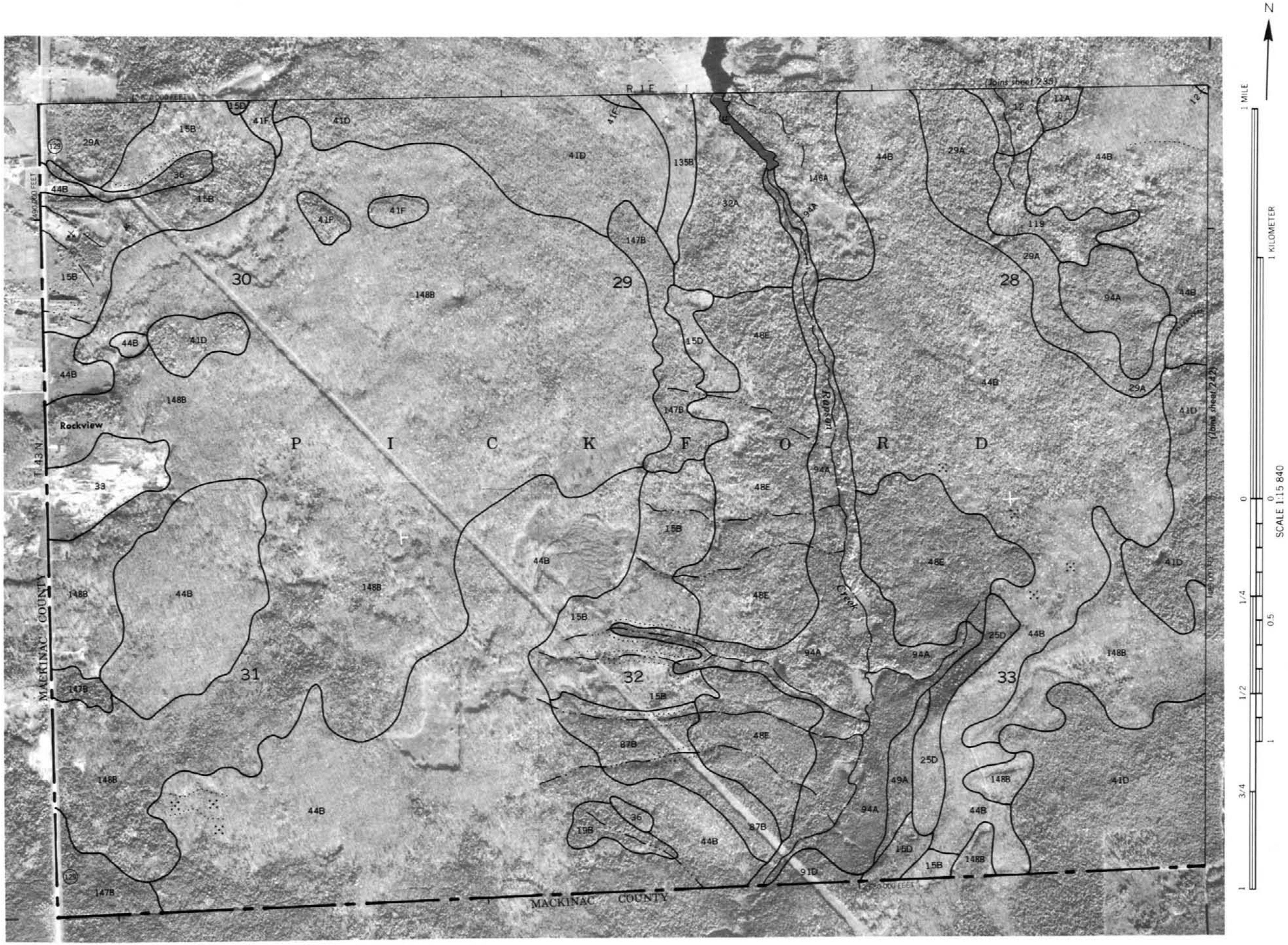
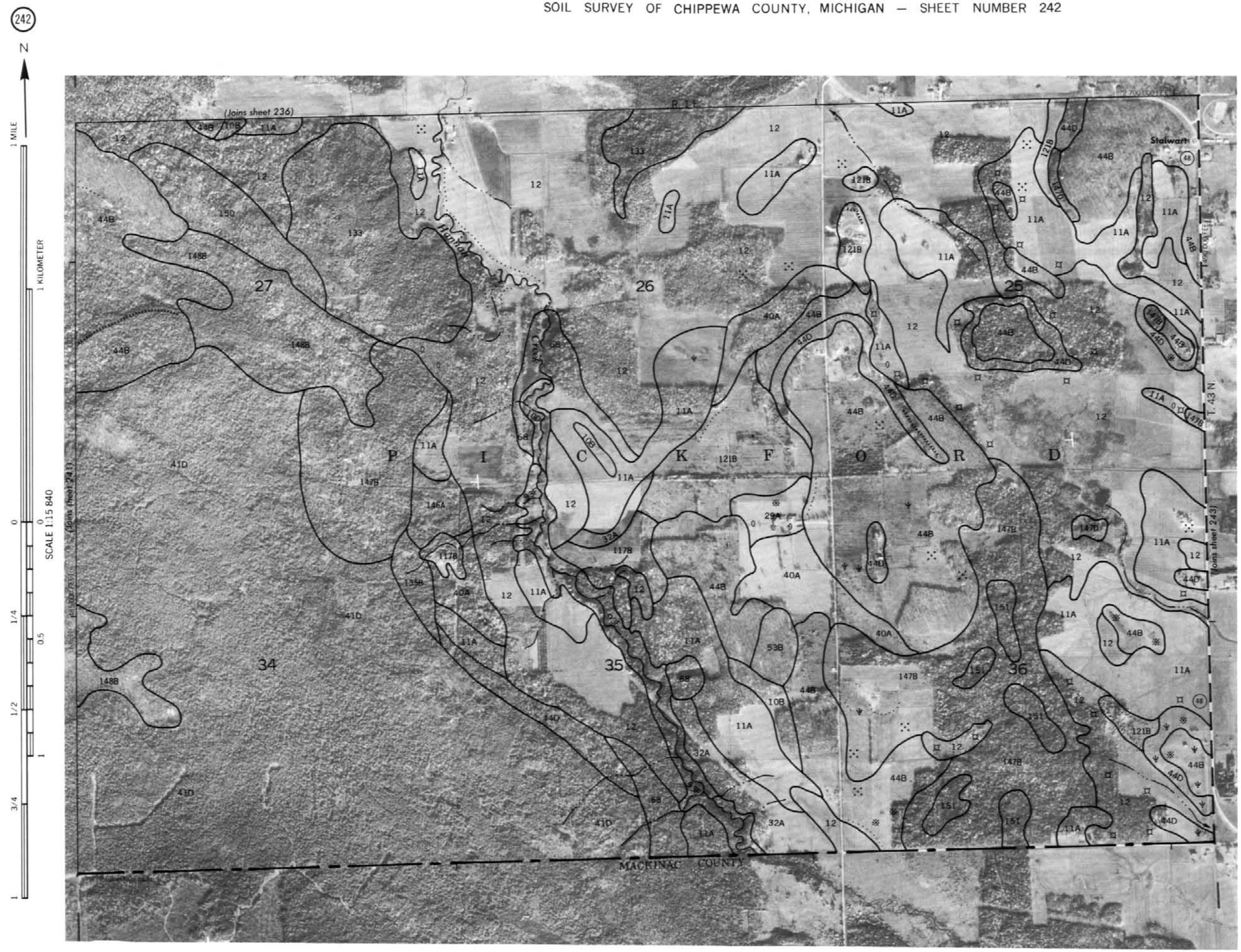
CHIPPEWA COUNTY, MICHIGAN NO. 241


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
R 1 E
(Joins sheet 238)
(Joins sheet 242)
T 43 N
MACKINAC COUNTY
MACKINAC COUNTY
Rockview
P I C K F O R D
Rapson Creek
28
29
30
31
32
33
129
129
15B
15D
29A
36
41F
41D
44B
135B
32A
146A
94A
12
12A
119
147B
148B
48E
15D
33
25D
87B
49A
91D
41D
19B
148B

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 242



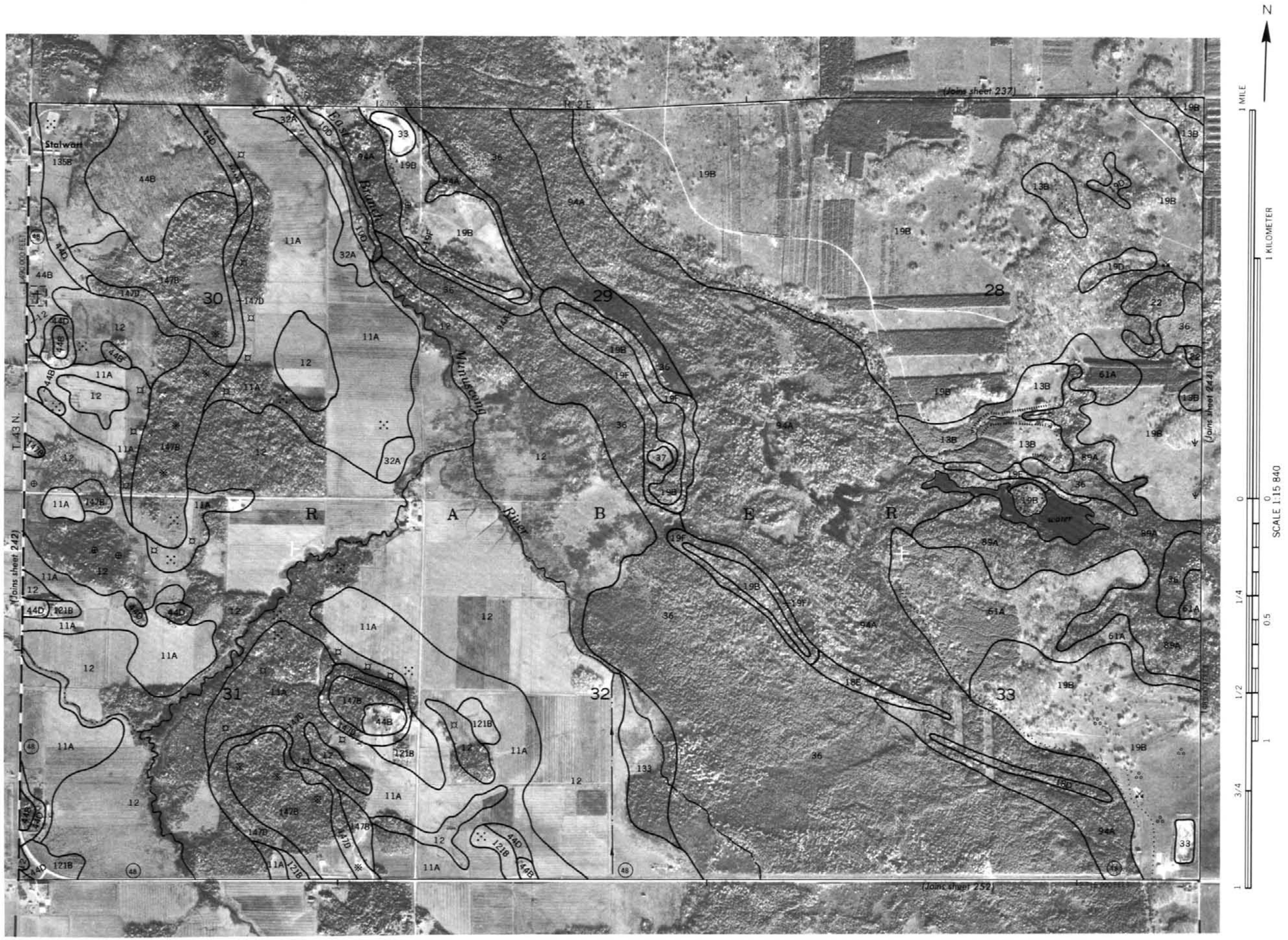
242
N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
(Joins sheet 236)
(Joins sheet 241)
(Joins sheet 243)
Stalwart
48
T. 43 N.
PICKFORD
MACKINAC COUNTY
27
26
25
34
35
36
12
11A
44B
44D
10B
133
150
148B
41D
147B
146A
117B
135B
40A
32A
29A
121B
147D
53B
6B
151
0

CHIPPEWA COUNTY, MICHIGAN NO. 242

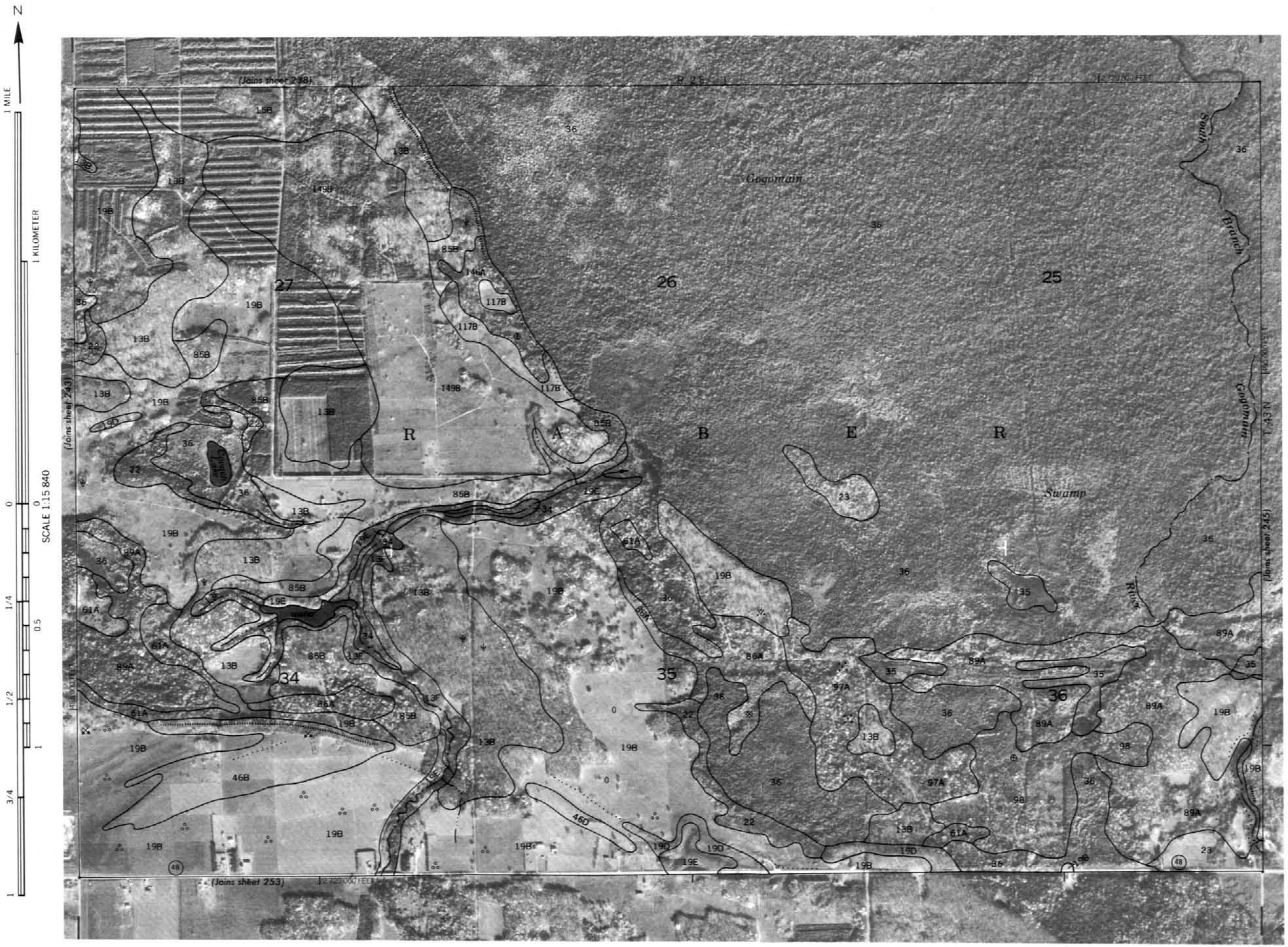
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 243


N
(Joins sheet 237)
(Joins sheet 242)
(Joins sheet 244)
(Joins sheet 252)
R. 2 E.
T. 43 N.
Stalwart
East Branch
Munuscong River
R A B E R
28
29
30
31
32
33
water
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
11A
12
13B
19B
19F
32A
33
36
44B
44D
61A
89A
94A
121B
135B
147B
147D

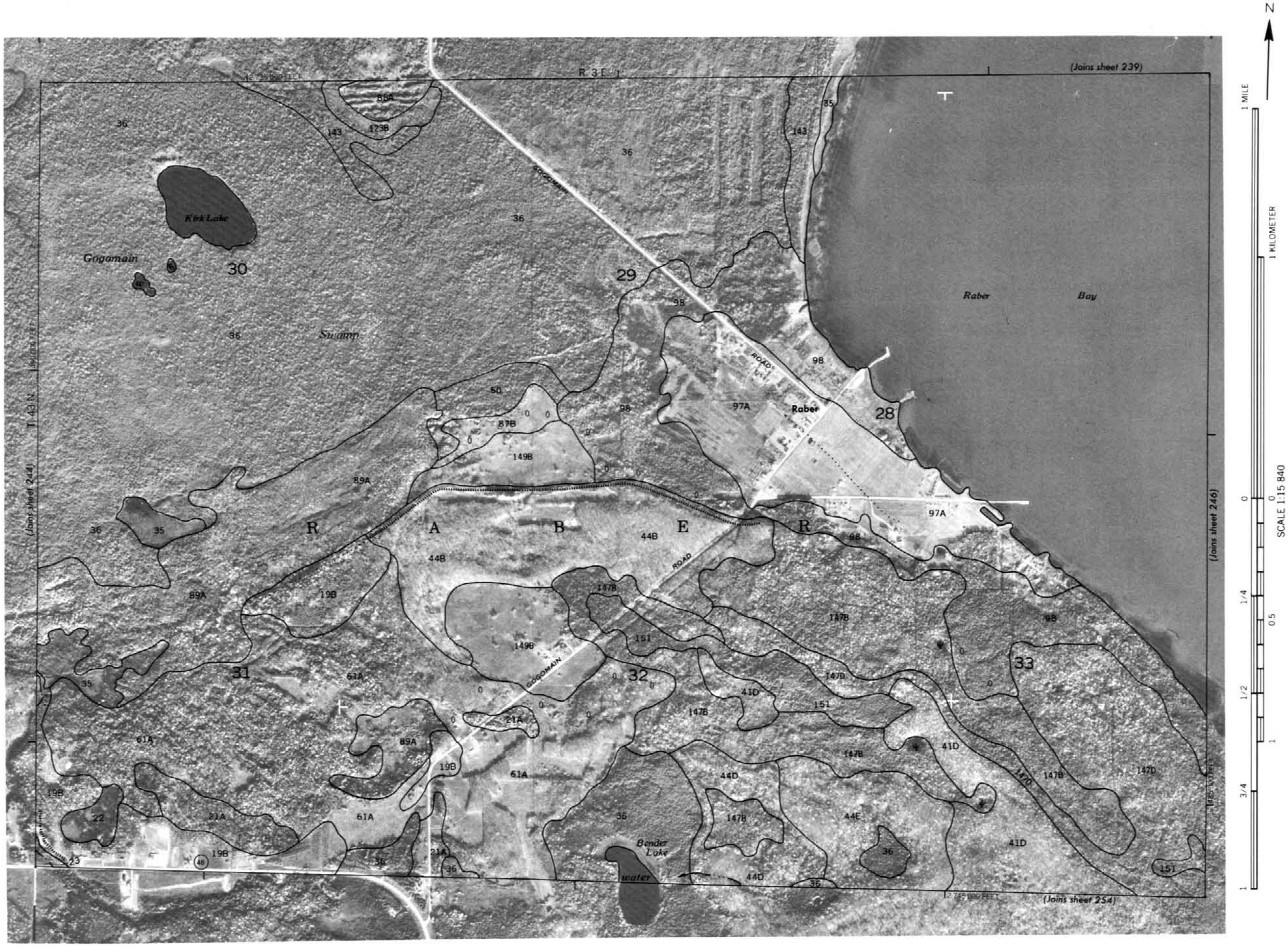
SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 244


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 238)
(Joins sheet 243)
(Joins sheet 245)
(Joins sheet 253)
R 2 E
T 43 N
2 720 000 FEET
Gogomain
South Branch Gogomain River
Swamp
B E R R A
25
26
27
34
35
36
13B
19B
19D
19E
22
23
35
36
46B
46D
48
61A
85B
86A
89A
97A
98
117B
146A
149B
0

CHIPPEWA COUNTY, MICHIGAN NO. 244

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

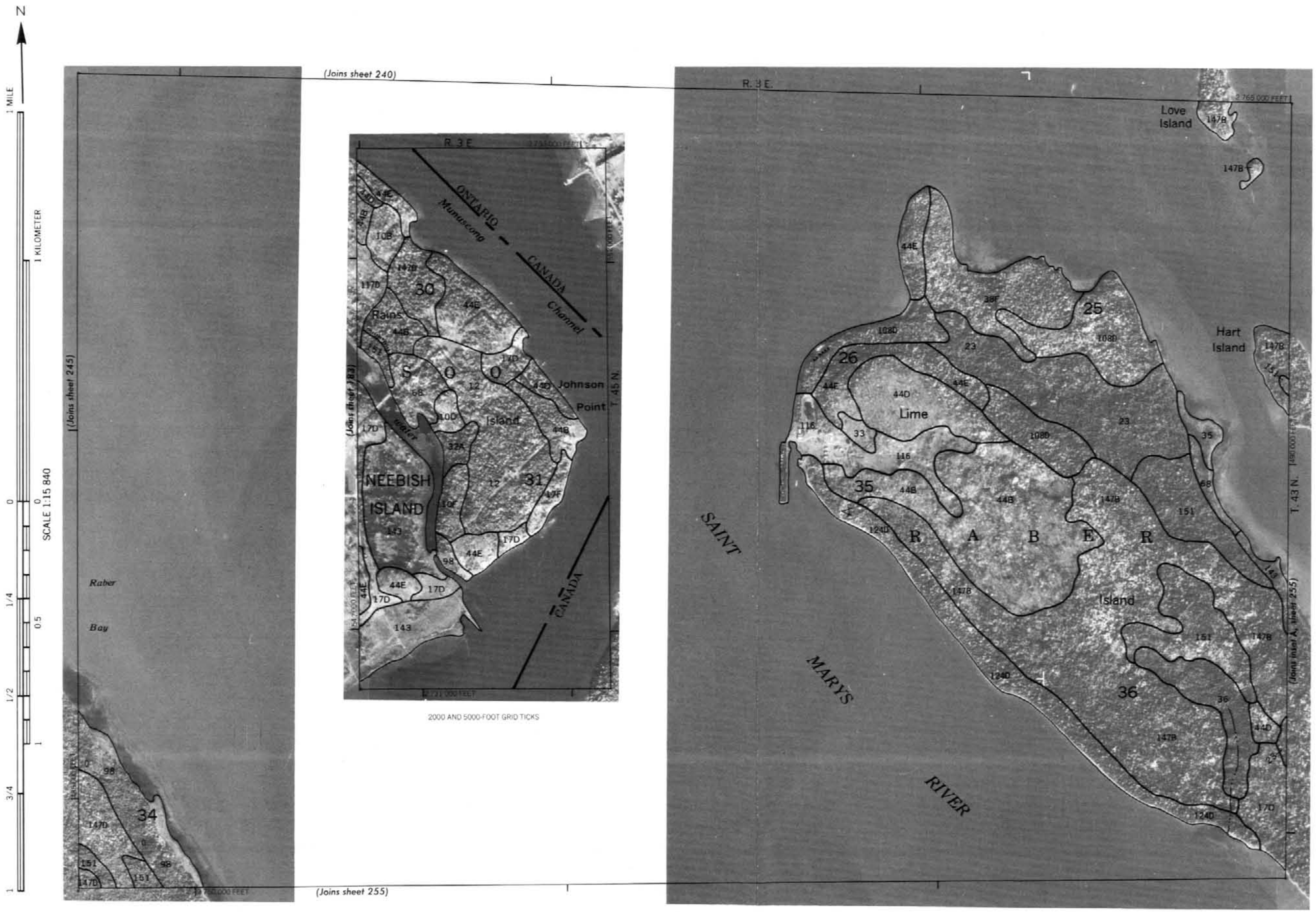
SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 245


245
N
(Joins sheet 239)
R 3 E
36
88A
123B
143
35
143
36
GOGOMAIN
Kirk Lake
Gogomain
30
36
Swamp
29
98
ROAD
98
97A
Raber
28
Raber
Bay
50
87B
149B
98
89A
T 43 N
(Joins sheet 244)
36
35
R
A
B
E
R
44B
44B
19B
97A
98
147B
147B
98
151
149B
GOGOMAIN
ROAD
32
33
31
61A
35
41D
151
147D
147B
21A
89A
19B
61A
61A
147B
41D
147D
147B
19B
22
21A
19B
61A
36
21A
36
36
Bender
Lake
water
44D
44D
147B
44E
36
41D
147D
151
36
(Joins sheet 246)
(Joins sheet 254)
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
SCALE 1:15 840

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 245

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 246


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 240)
(Joins sheet 255)
(Joins sheet 245)
(Joins sheet 182)
(Joins inset A, sheet 255)
R. 3 E.
T. 45 N.
T. 43 N.
2 765 000 FEET
2 750 000 FEET
2000 AND 5000-FOOT GRID TICKS
Raber
Bay
ONTARIO
CANADA
Munuscong
Channel
Johnson
Point
SOO
Island
NEEBISH
ISLAND
Rains
Lime
Island
RABER
SAINT
MARYS
RIVER
Love
Island
Hart
Island
25
26
30
31
34
35
36
10B
12
17D
17F
23
32A
33
35
36
38F
44B
44D
44E
68
98
108D
116
124D
143
147B
147D
151

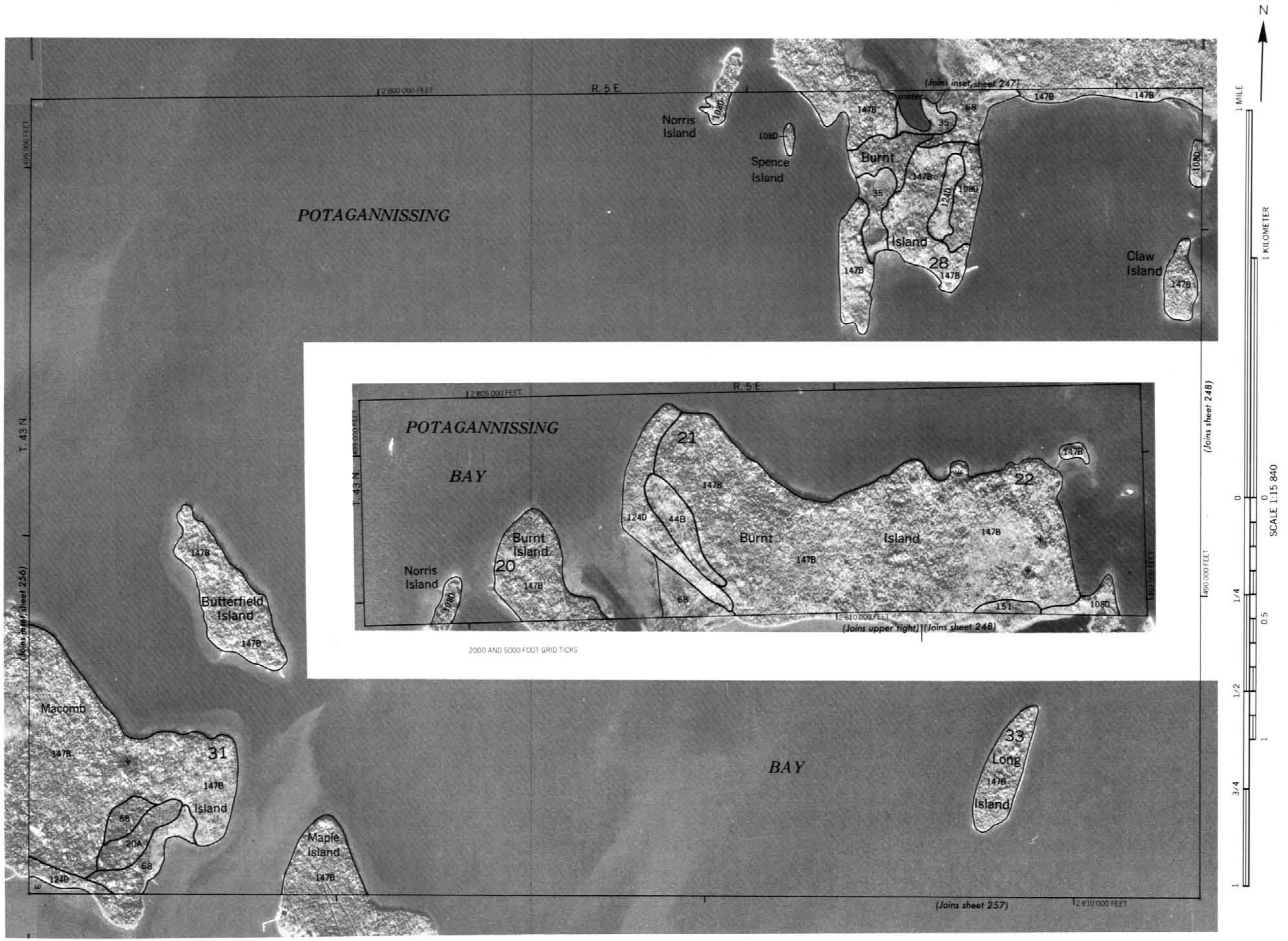
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 246

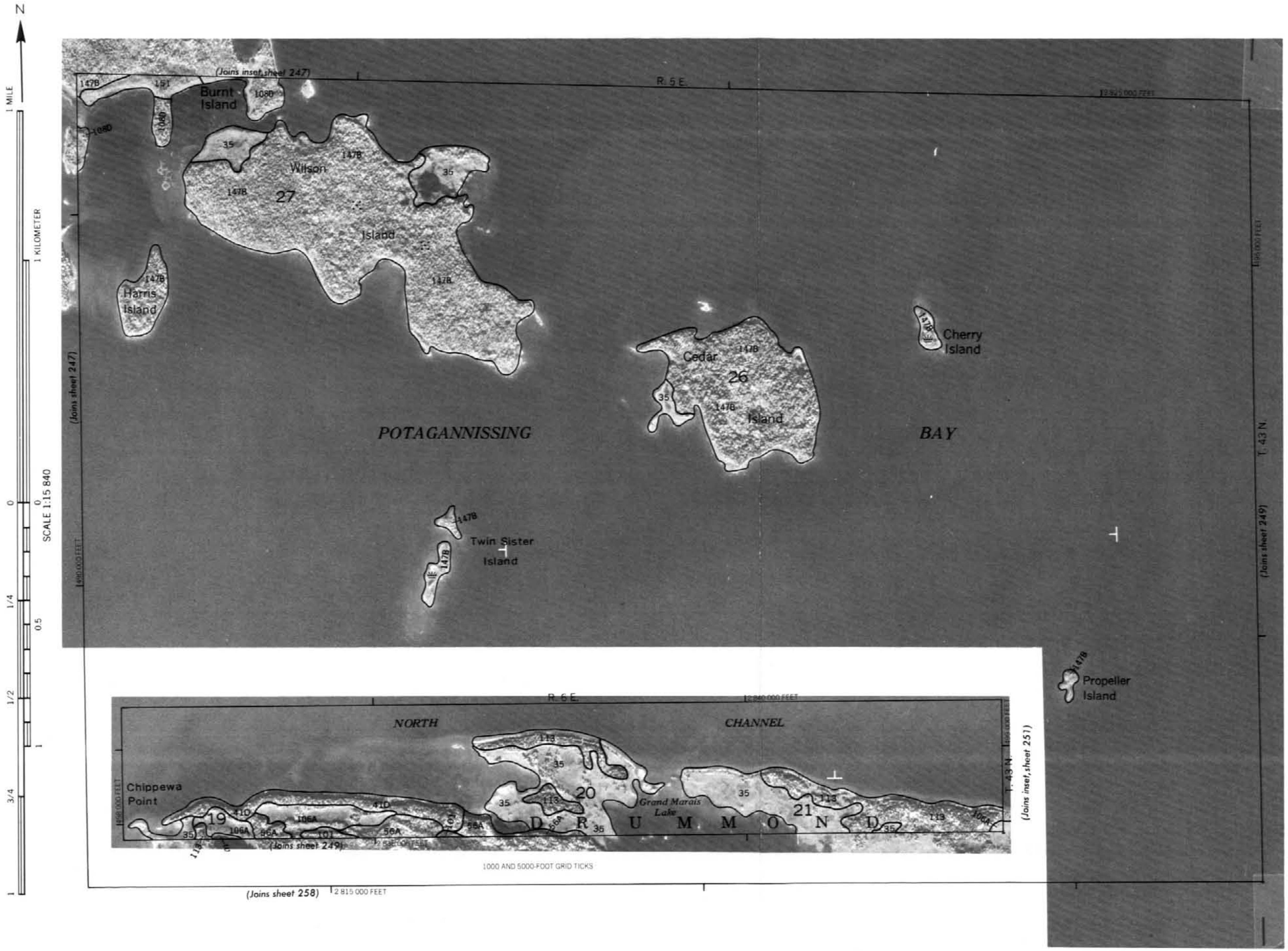
SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 247

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 247


N
POTAGANNISSING
BAY
R. 5 E.
T. 43 N.
2 800 000 FEET
495 000 FEET
(Joins inset, sheet 247)
(Joins map sheet 256)
(Joins sheet 248)
(Joins sheet 257)
2 810 000 FEET
490 000 FEET
Norris Island
Spence Island
Burnt Island
28
Claw Island
Butterfield Island
Macomb Island
31
Maple Island
33
Long Island
water
147B
108D
68
35
124D
20A
w
2 805 000 FEET
489 000 FEET
21
22
20
44B
151
(Joins upper right)
2000 AND 5000-FOOT GRID TICKS
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 248

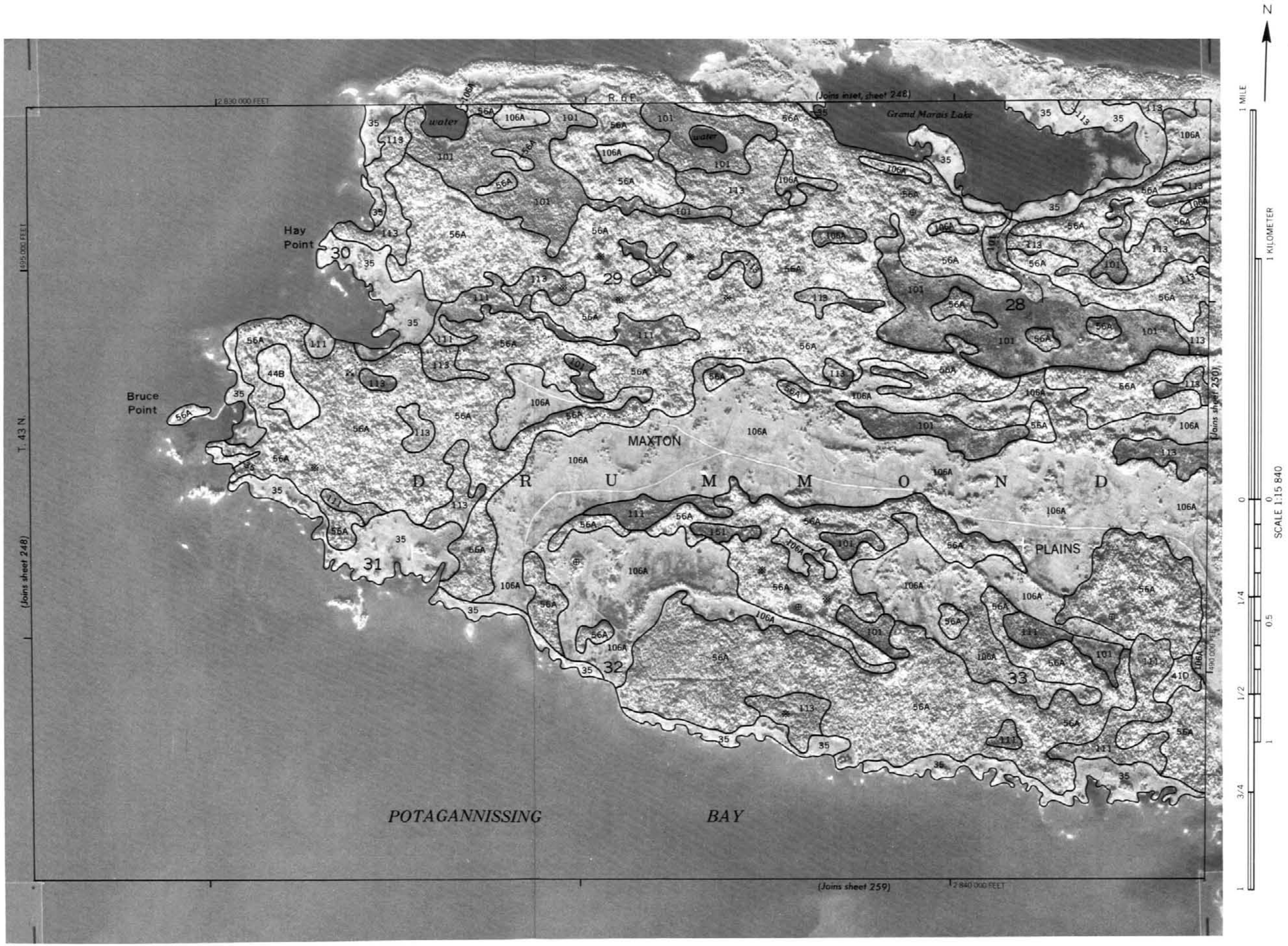

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins inset sheet 247)
R. 5 E.
147B
151
108D
Burnt Island
Wilson Island
27
35
Harris Island
POTAGANNISSING
Cedar Island
26
Cherry Island
BAY
T. 43 N.
Twin Sister Island
Propeller Island
(Joins sheet 247)
(Joins sheet 249)
(Joins sheet 258)
2 815 000 FEET
R. 6 E.
NORTH
CHANNEL
Chippewa Point
19
20
21
Grand Marais Lake
D R U M M O N D
113
410
106A
86A
56A
101
(Joins sheet 249)
(Joins inset sheet 251)
1000 AND 5000-FOOT GRID TICKS

CHIPPEWA COUNTY, MICHIGAN NO. 248

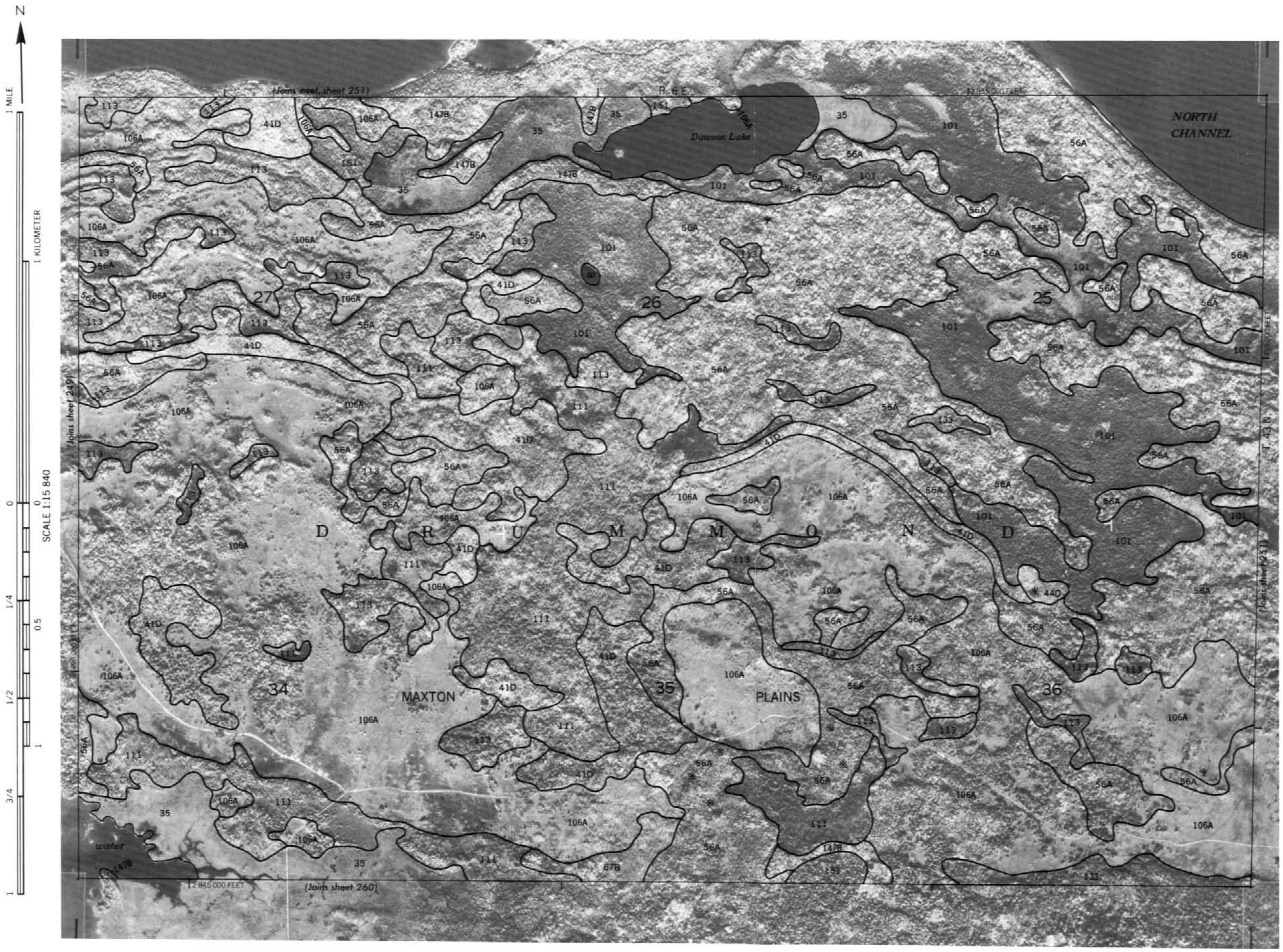
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 249

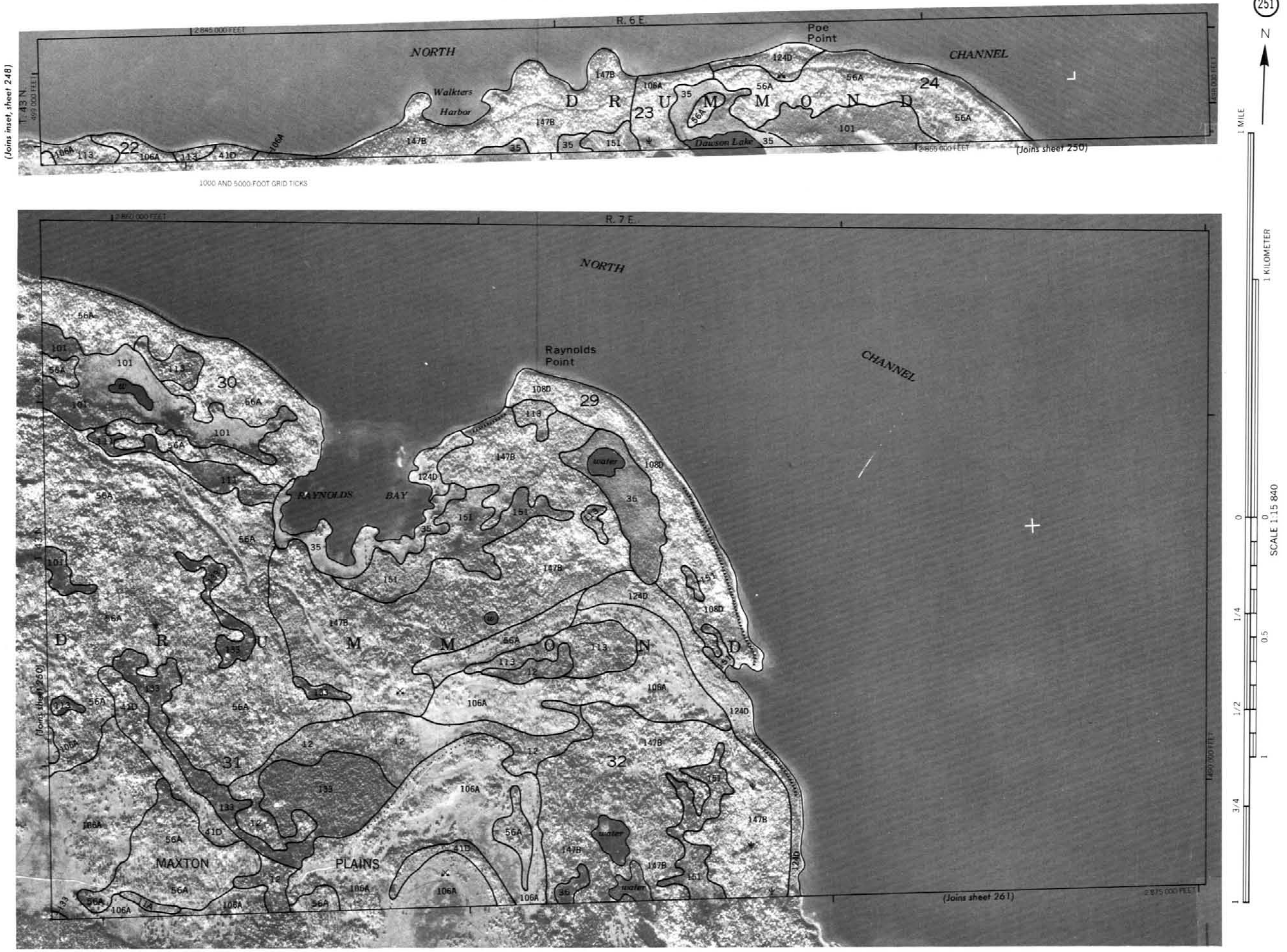

N
(Joins inset, sheet 248)
R. 6 E.
2 830 000 FEET
495 000 FEET
T. 43 N.
(Joins sheet 248)
(Joins sheet 250)
(Joins sheet 259)
2 840 000 FEET
490 000 FEET
Grand Marais Lake
water
Hay Point
Bruce Point
MAXTON
D R U M M O N D
PLAINS
POTAGANNISSING BAY
28
29
30
31
32
33
35
44B
56A
101
106A
111
113
151
41D
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 250


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins inset, sheet 251)
R. 6 E.
2 855 000 FEET
Dawson Lake
NORTH CHANNEL
(Joins sheet 249)
(Joins sheet 251)
T. 43 N.
27
26
25
34
35
36
D R U M M O N D
MAXTON
PLAINS
water
2 845 000 FEET
(Joins sheet 260)
113
41D
106A
147B
35
151
101
56A
111
44D
67B
133
w

CHIPPEWA COUNTY, MICHIGAN NO. 250

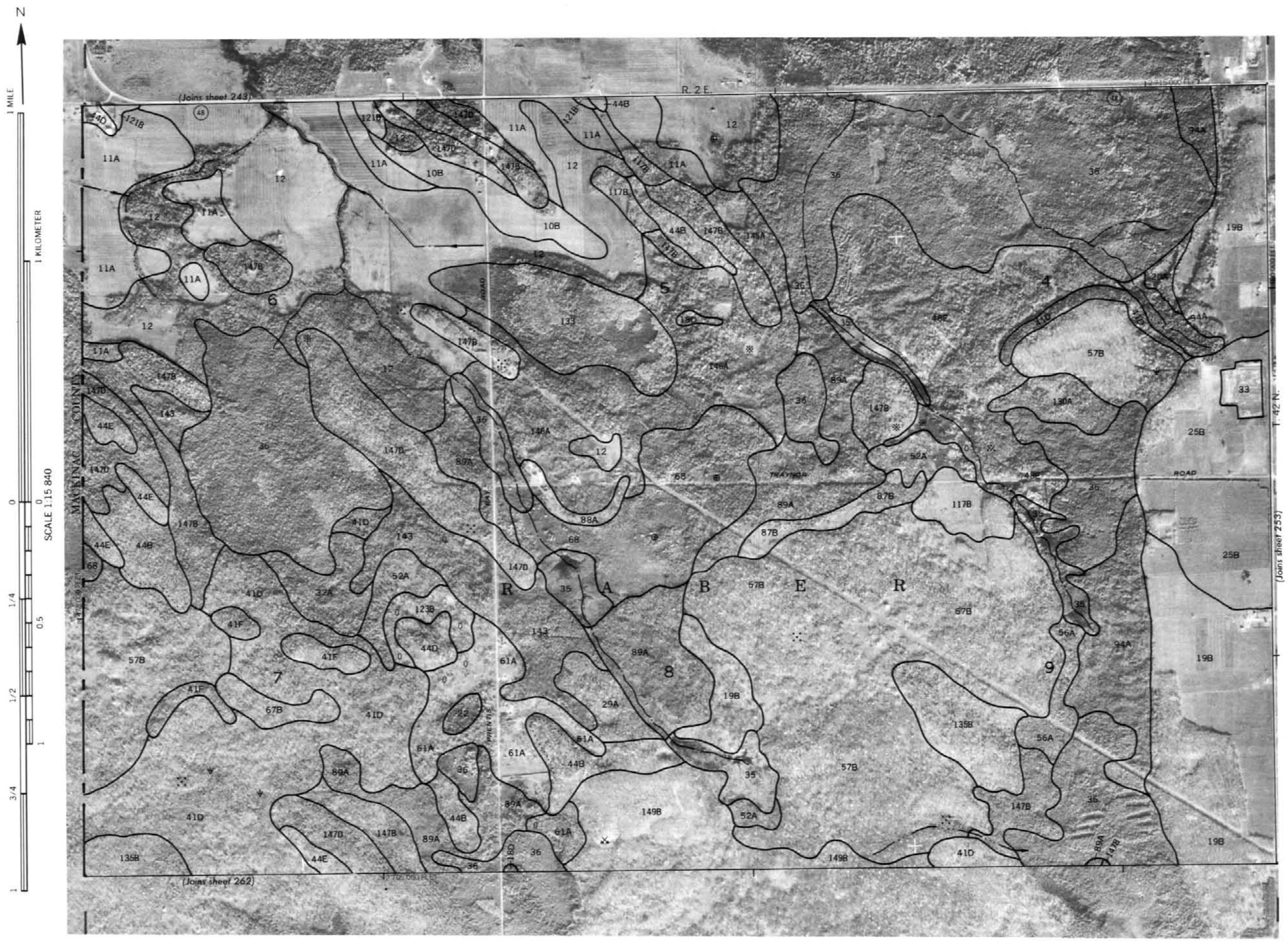
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


R. 6 E.
2 845 000 FEET
T. 43 N.
499 000 FEET
(Joins inset, sheet 248)
NORTH
CHANNEL
Poe Point
Walkters Harbor
Dawson Lake
D R U M M O N D
22
23
24
106A
113
41D
147B
35
151
56A
124D
101
(Joins sheet 250)
2 865 000 FEET
1000 AND 5000-FOOT GRID TICKS
R. 7 E.
2 860 000 FEET
NORTH
CHANNEL
Raynolds Point
RAYNOLDS BAY
D R U M M O N D
MAXTON PLAINS
29
30
31
32
56A
101
113
108D
147B
124D
151
35
36
water
w
12
133
41D
106A
(Joins sheet 250)
(Joins sheet 261)
2 875 000 FEET
490 000 FEET
N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 251

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 252


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 243)
R. 2 E.
T. 42 N.
(Joins sheet 253)
(Joins sheet 262)
MACKINAC COUNTY
R A B E R
TRAYNOR ROAD
ROAD
4
5
6
7
8
9
48
34
11A
12
121B
44D
147B
147D
10B
117B
44B
36
19B
94A
57B
33
130A
25B
148A
133
18D
89A
35
52A
87B
117B
143
44E
41D
41F
32A
123B
44D
61A
22
29A
89A
149B
135B
56A
68
88A
41D
67B
57B
36
44E
18D
149B

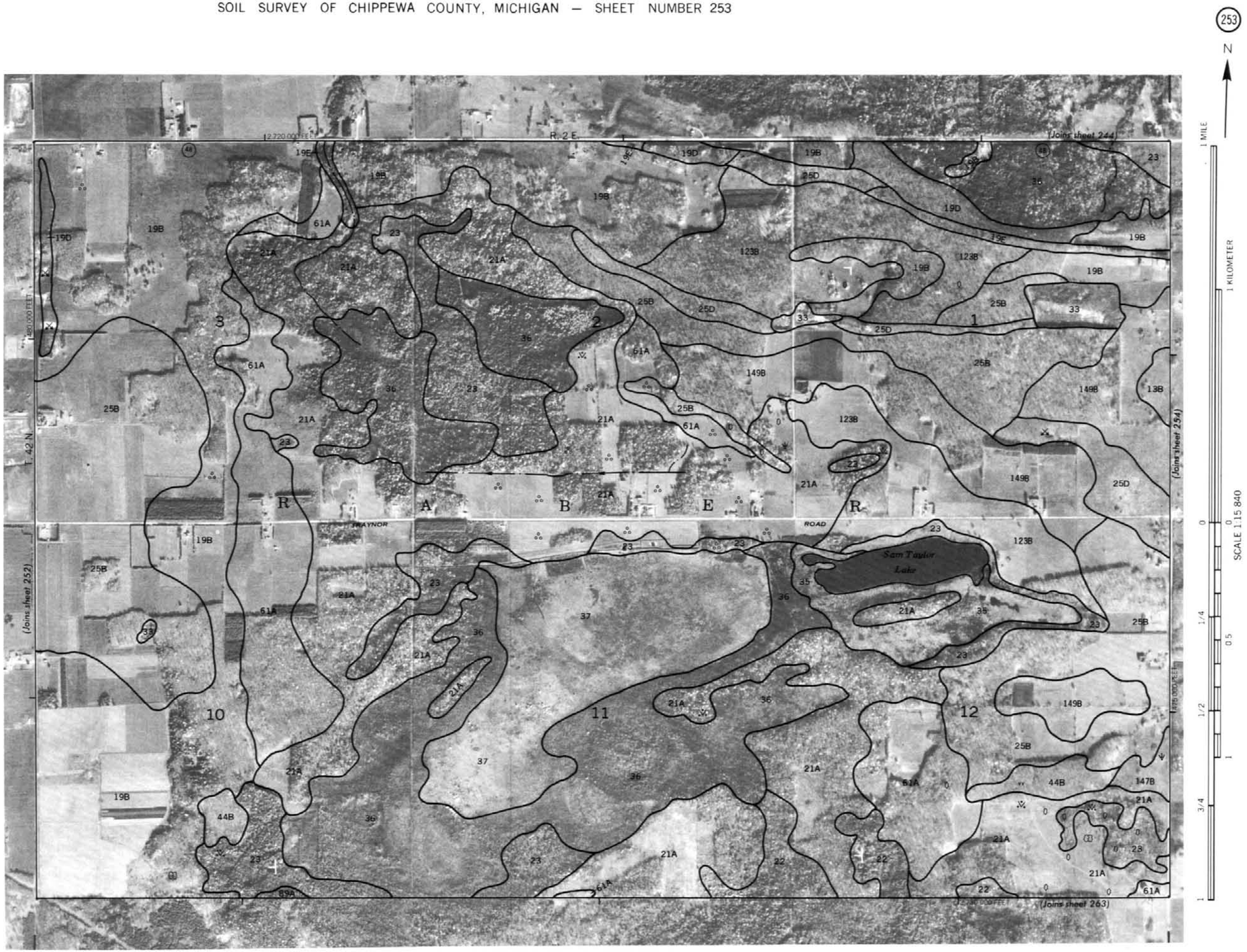
CHIPPEWA COUNTY, MICHIGAN NO. 252

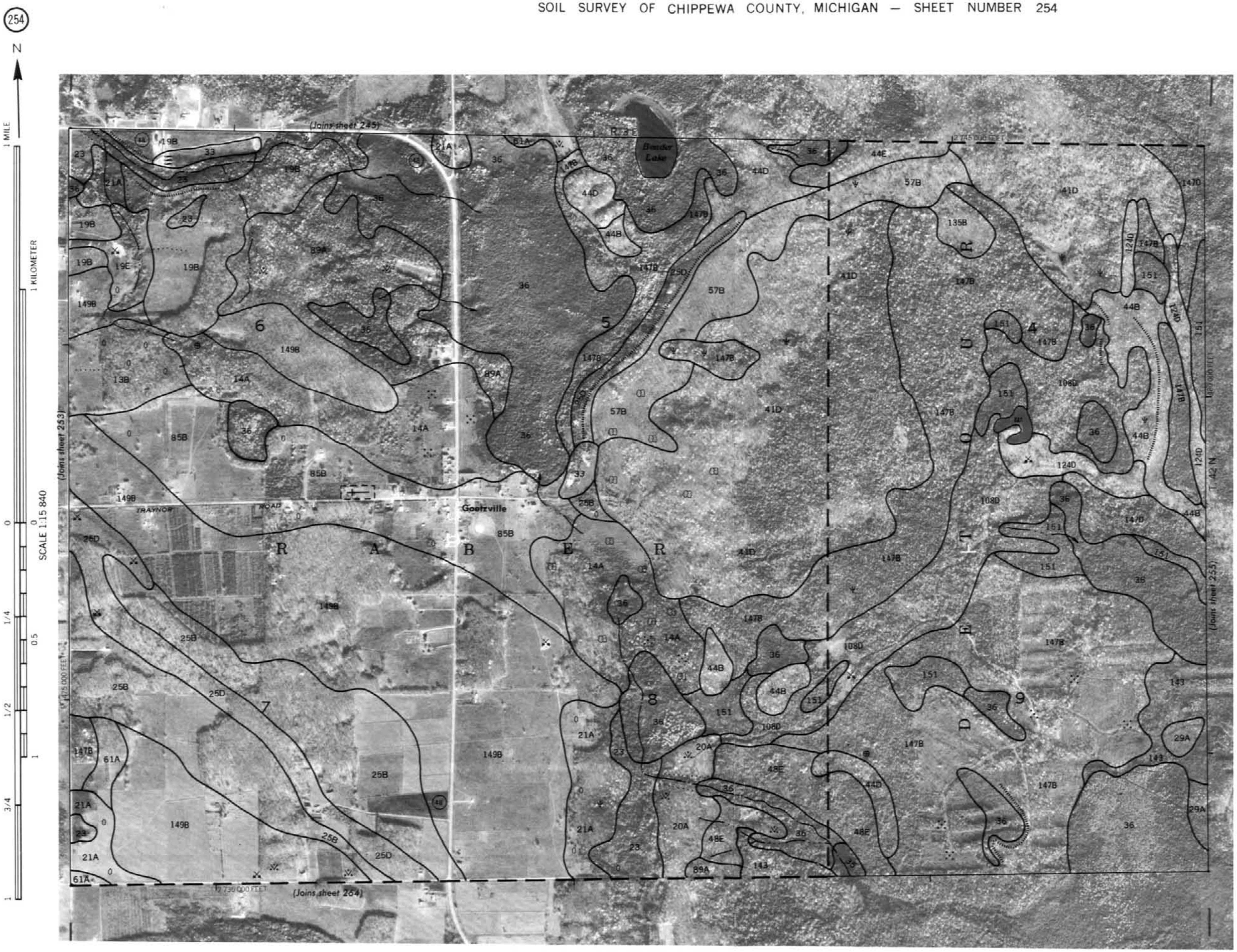
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 253

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 253


253
N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840
R. 2 E.
T. 42 N.
2 720 000 FEET
480 000 FEET
475 000 FEET
(Joins sheet 244)
(Joins sheet 254)
(Joins sheet 252)
(Joins sheet 263)
TRAYNOR
ROAD
Sam Taylor Lake
R
A
B
E
R
1
2
3
10
11
12
19B
19D
19E
61A
21A
23
36
25B
25D
123B
149B
13B
33
35
37
44B
147B
22
28
89A



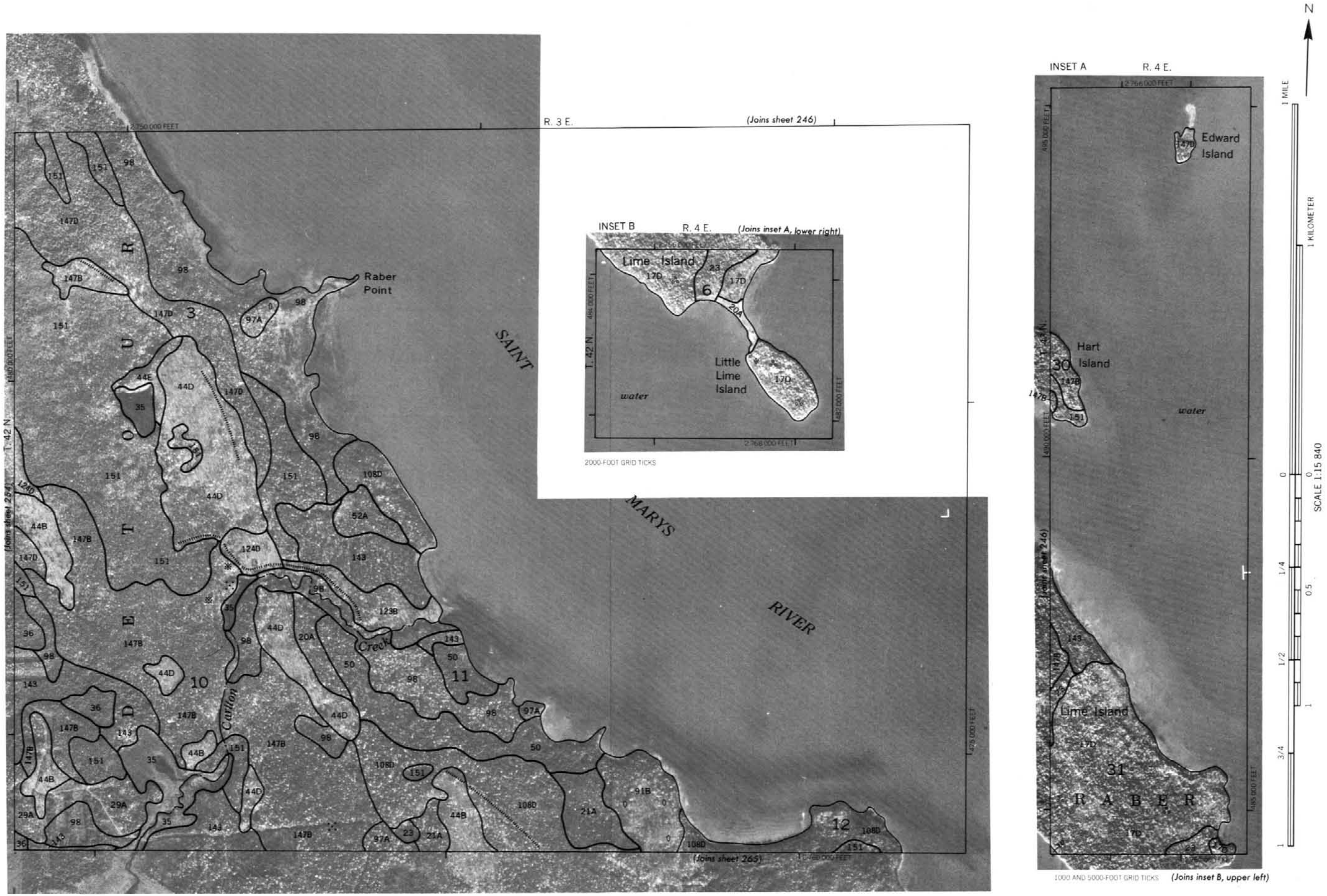
254
N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
(Joins sheet 245)
(Joins sheet 253)
(Joins sheet 255)
(Joins sheet 264)
Bender Lake
Goetzville
TRAYNOR ROAD
R A B E R
T O U R D E
R 3 E
T 42 N
5
6
7
8
9
4
19B
23
33
21A
36
61A
44D
44B
44E
147B
57B
135B
41D
25D
14A
13B
149B
85B
89A
33
25B
14A
36
151
108D
124D
147D
29A
143
48E
20A
61A

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 254

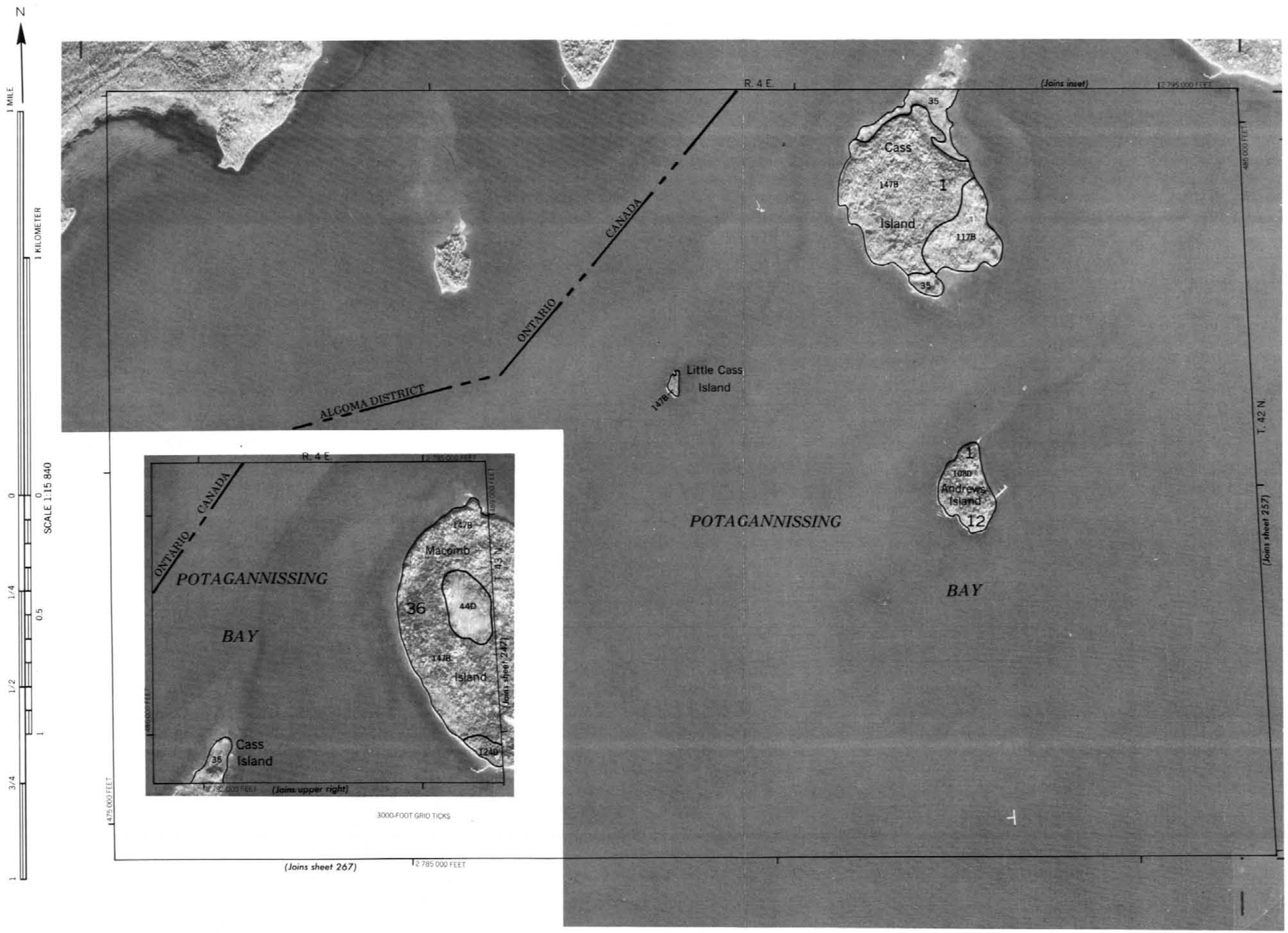
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 255


R. 3 E.
(Joins sheet 246)
2 750 000 FEET
T. 42 N.
(Joins sheet 254)
(Joins sheet 265)
2 760 000 FEET
475 000 FEET
480 000 FEET
Raber Point
SAINT MARYS RIVER
Carlton Creek
T O U R E T D E
3
10
11
12
151
98
147D
147B
97A
44E
44D
35
124D
124D
143
108D
52A
123B
44B
36
20A
50
97A
29A
21A
91B
23
INSET B
R. 4 E.
(Joins inset A, lower right)
Lime Island
Little Lime Island
6
17D
23
20A
water
T. 42 N.
486 000 FEET
482 000 FEET
2 768 000 FEET
2000-FOOT GRID TICKS
INSET A
R. 4 E.
2 766 000 FEET
Edward Island
Hart Island
30
31
Lime Island
R A B E R
water
(Joins inset B, upper left)
1000 AND 5000-FOOT GRID TICKS
495 000 FEET
490 000 FEET
485 000 FEET
T. 43 N.
N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

㉖₅₆

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 256

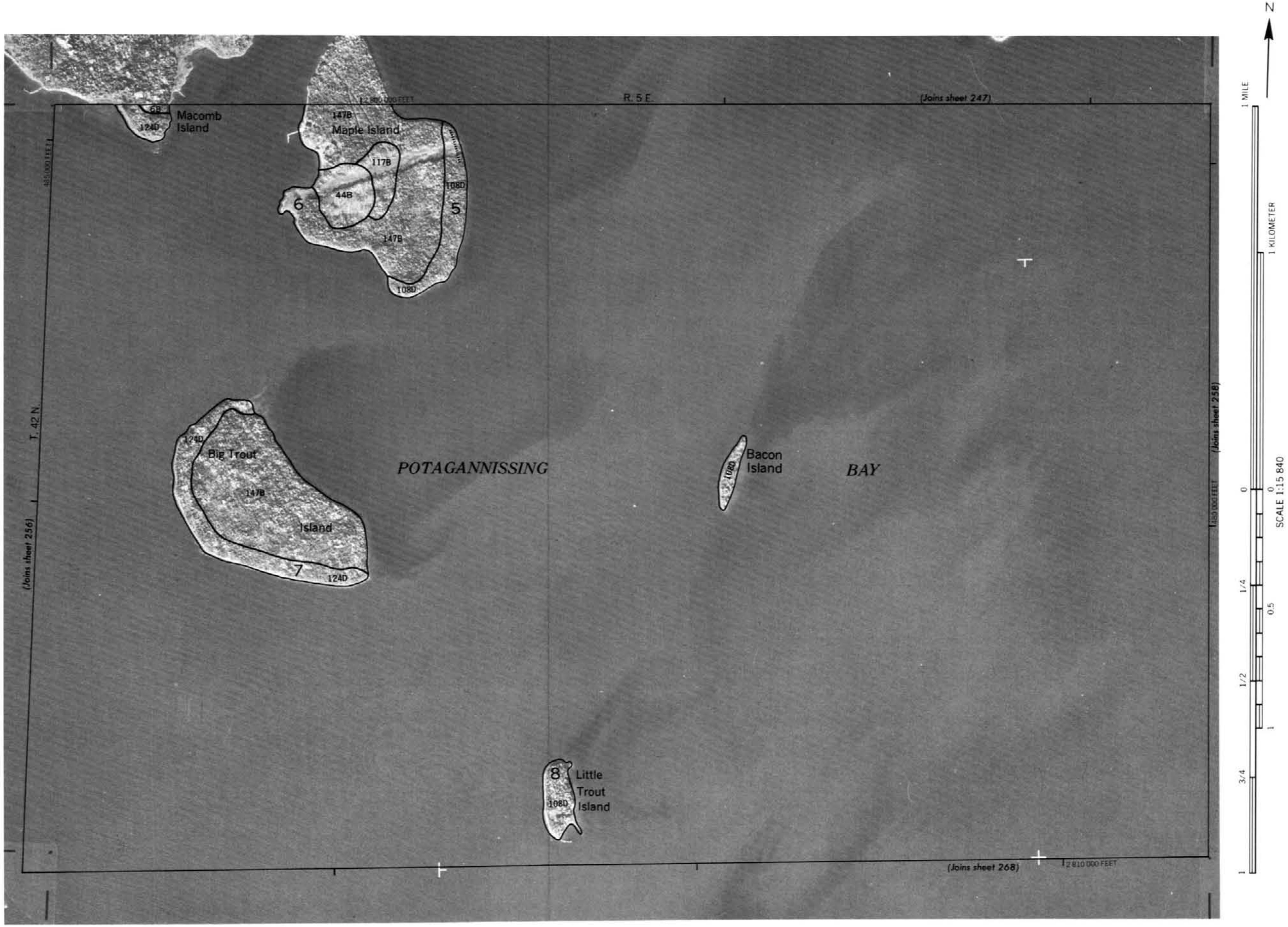

N
1 MILE
1 KILOMETER
0
0
SCALE 1:15 840
1/4
0.5
1/2
1
3/4
1
R. 4 E.
(Joins inset)
2 795 000 FEET
486 000 FEET
35
Cass
147B
1
Island
117B
35
CANADA
ONTARIO
ALGOMA DISTRICT
Little Cass
Island
147B
T. 42 N.
1
108D
Andrews
Island
12
POTAGANNISSING
BAY
(Joins sheet 257)
R. 4 E.
2 795 000 FEET
489 000 FEET
CANADA
ONTARIO
POTAGANNISSING
BAY
147B
Macomb
36
44D
43 N.
147B
Island
(Joins sheet 247)
124D
486 000 FEET
35
Cass
Island
2 792 000 FEET
(Joins upper right)
3000-FOOT GRID TICKS
475 000 FEET
(Joins sheet 267)
2 785 000 FEET

CHIPPEWA COUNTY, MICHIGAN NO. 256

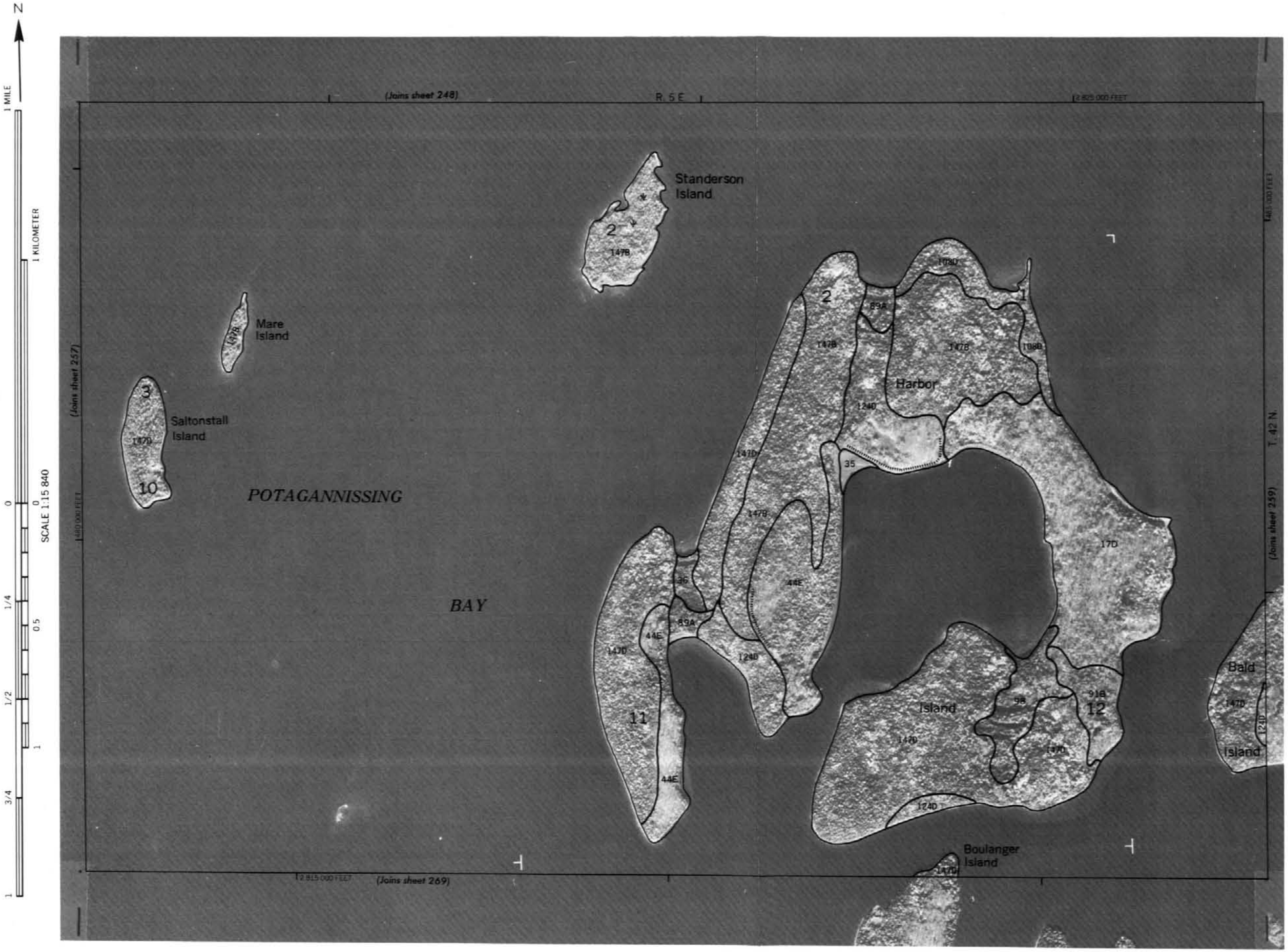
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from **1981 - 1983** aerial photography. Coordinate **grid** ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 257


N
6B
124D
Macomb Island
147B
Maple Island
117B
44B
108D
6
5
147B
108D
2 800 000 FEET
R. 5 E.
(Joins sheet 247)
485 000 FEET
T. 42 N.
(Joins sheet 256)
124D
Big Trout Island
147B
7
124D
POTAGANNISSING
Bacon Island
108D
BAY
(Joins sheet 258)
8
Little Trout Island
108D
(Joins sheet 268)
2 810 000 FEET
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
SCALE 1:15 840

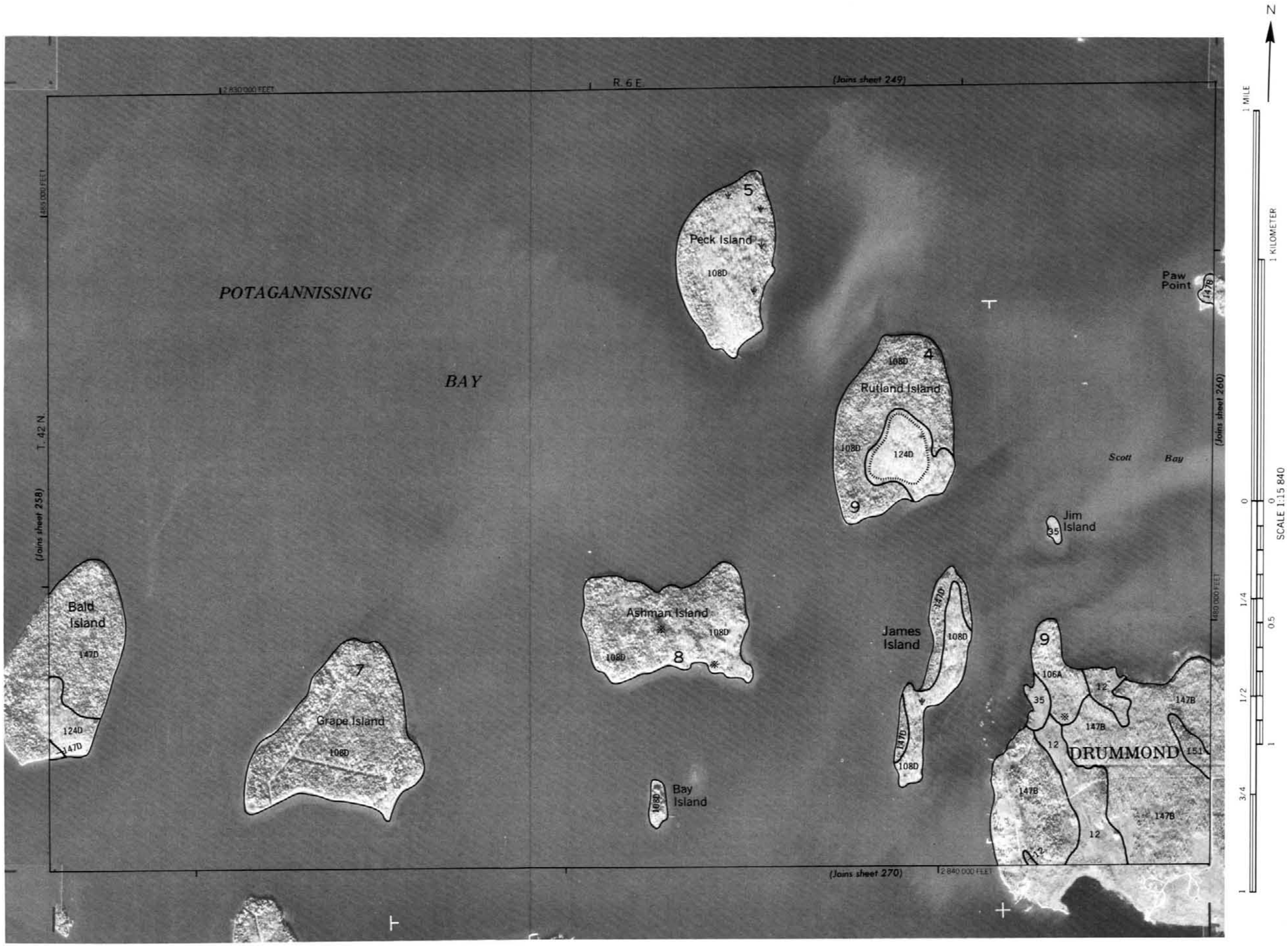
SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 258


N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
SCALE 1:15 840
(Joins sheet 248)
R. 5 E.
2 825 000 FEET
485 000 FEET
T. 42 N.
(Joins sheet 259)
(Joins sheet 257)
480 000 FEET
2 815 000 FEET
(Joins sheet 269)
Standerson Island
2
147B
Mare Island
147B
Saltonstall Island
3
147D
10
POTAGANNISSING
BAY
2
89A
108D
1
147B
108D
Harbor
124D
147D
35
147B
44E
17D
36
89A
44E
147D
124D
11
44E
Island
98
91B
12
147D
147D
124D
Bald
147D
124D
Island
Boulanger Island
147D

CHIPPEWA COUNTY, MICHIGAN NO. 258

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 259

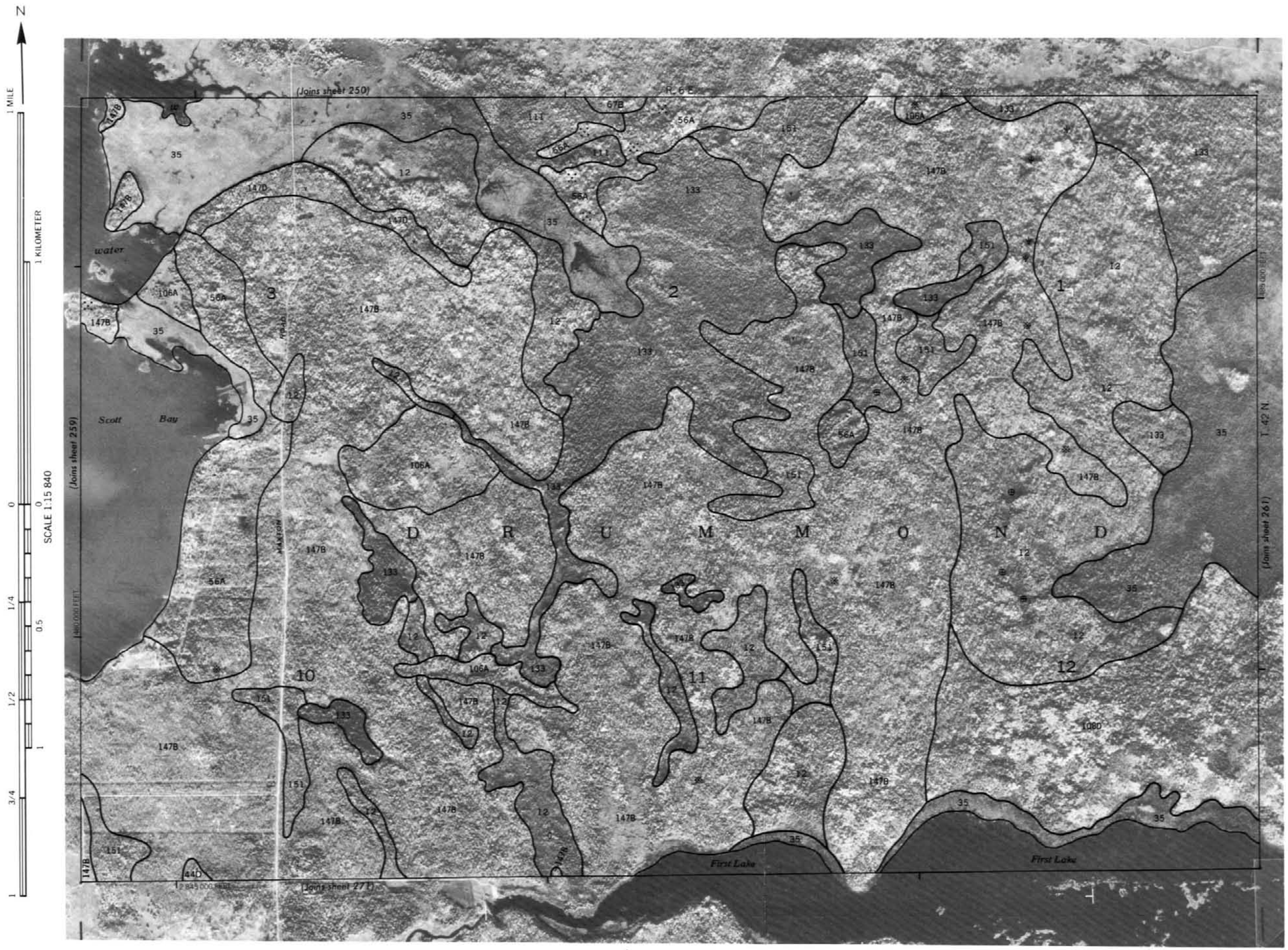


N
R. 6 E.
(Joins sheet 249)
2 830 000 FEET
490 000 FEET
T. 42 N.
(Joins sheet 258)
(Joins sheet 260)
(Joins sheet 270)
2 840 000 FEET
480 000 FEET
POTAGANNISSING
BAY
Peck Island
5
108D
Rutland Island
4
108D
124D
108D
9
Paw Point
147B
Scott
Bay
Jim Island
35
Bald Island
147D
124D
147D
Grape Island
7
108D
Ashman Island
108D
108D
8
James Island
147D
108D
147D
108D
Bay Island
108D
DRUMMOND
9
106A
12
35
147B
147B
12
151
147B
147B
12
12
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
SCALE 1:15 840

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from **1981 - 1983** aerial photography. Coordinate **grid** ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 259

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 260

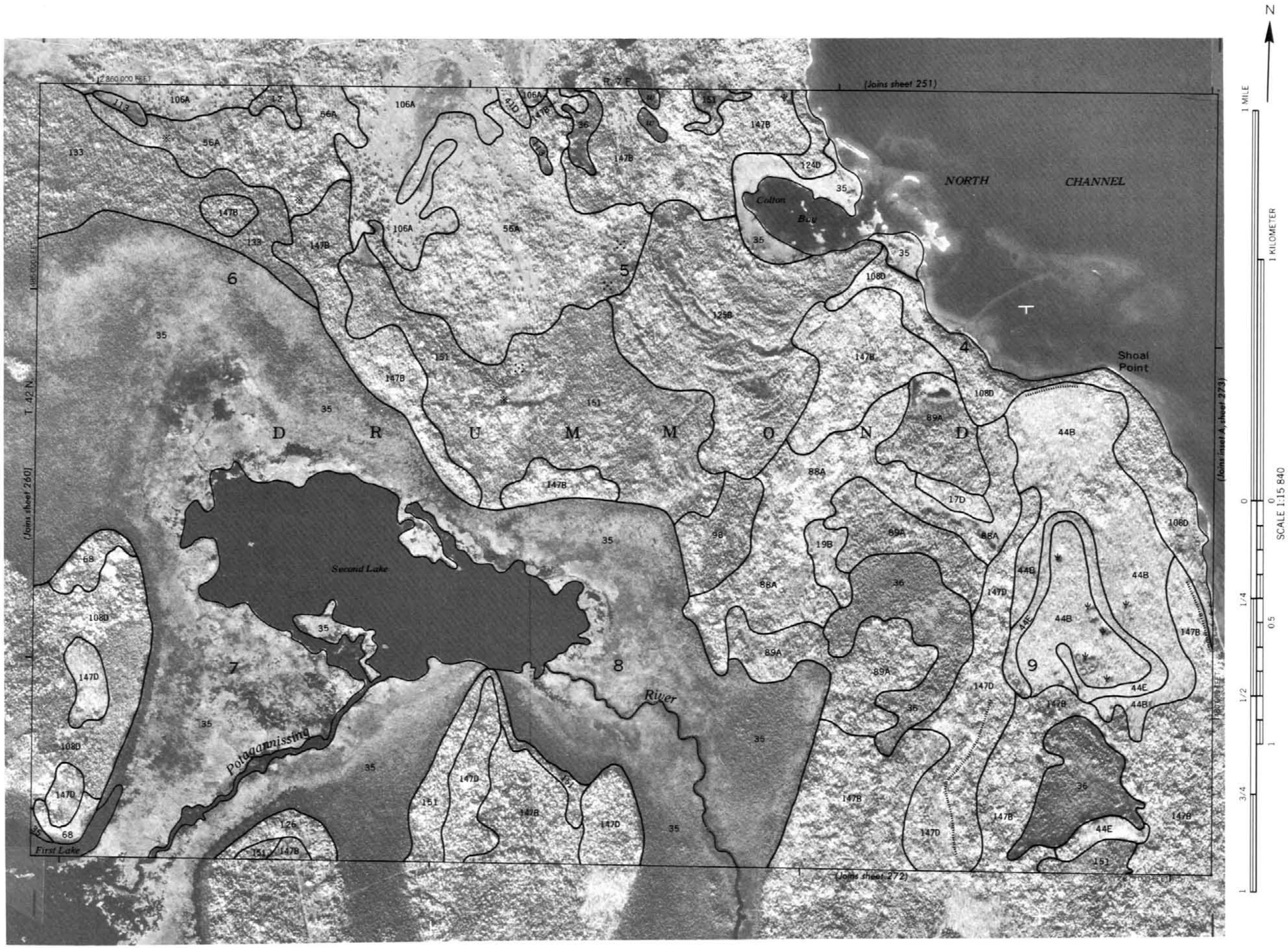

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 250)
R. 6 E.
(Joins sheet 259)
(Joins sheet 261)
(Joins sheet 271)
T. 42 N.
water
Scott Bay
First Lake
First Lake
D R U M M O N D
2 845 000 FEET
460 000 FEET
ROAD
1
2
3
10
11
12
12
35
56A
67B
106A
108D
111
133
147B
147D
151
440

CHIPPEWA COUNTY, MICHIGAN NO. 260

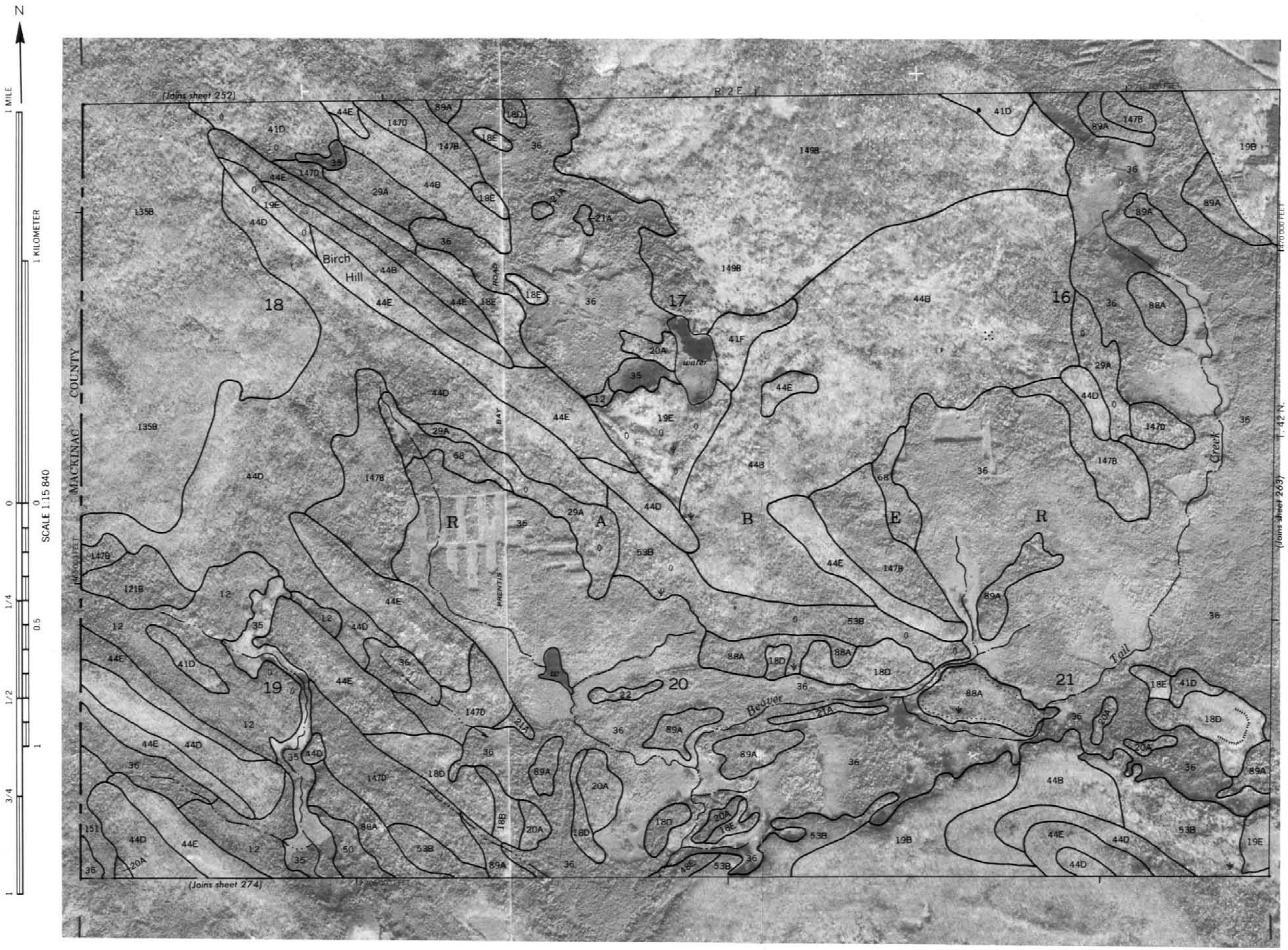
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 261


N
(Joins sheet 251)
(Joins sheet 260)
(Joins inset A, sheet 273)
(Joins sheet 272)
2 860 000 FEET
R. 7 E.
T. 42 N.
NORTH CHANNEL
Colton Bay
Shoal Point
Second Lake
First Lake
Potagannissing River
D R U M M O N D
4
5
6
7
8
9
133
106A
56A
147B
124D
35
108D
125B
151
89A
88A
44B
44E
17D
19B
98
36
147D
68
126
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 262

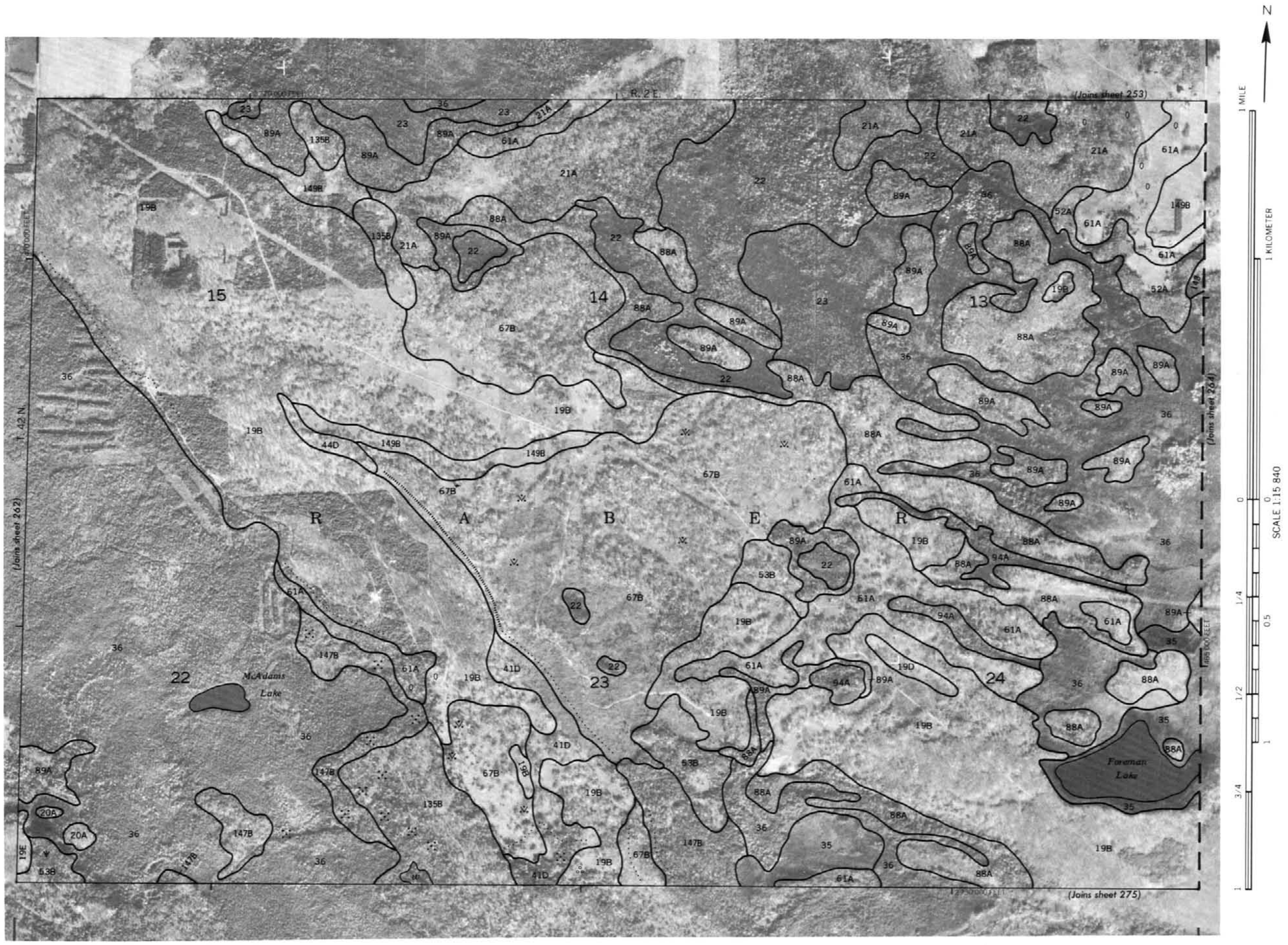

N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
SCALE 1:15 840
(Joins sheet 252)
(Joins sheet 274)
(Joins sheet 263)
R 2 E
T. 42 N.
MACKINAC COUNTY
18
17
16
19
20
21
Birch Hill
BAY ROAD
PRENTIS
R A B E R
water
w
Beaver
Tail
Creek
135B
41D
44E
147D
89A
18D
18E
36
35
29A
44B
149B
41F
20A
12
19E
44D
147B
68
53B
88A
121B
151
50
18B
21A
22
89A
147D
19B
88A
0

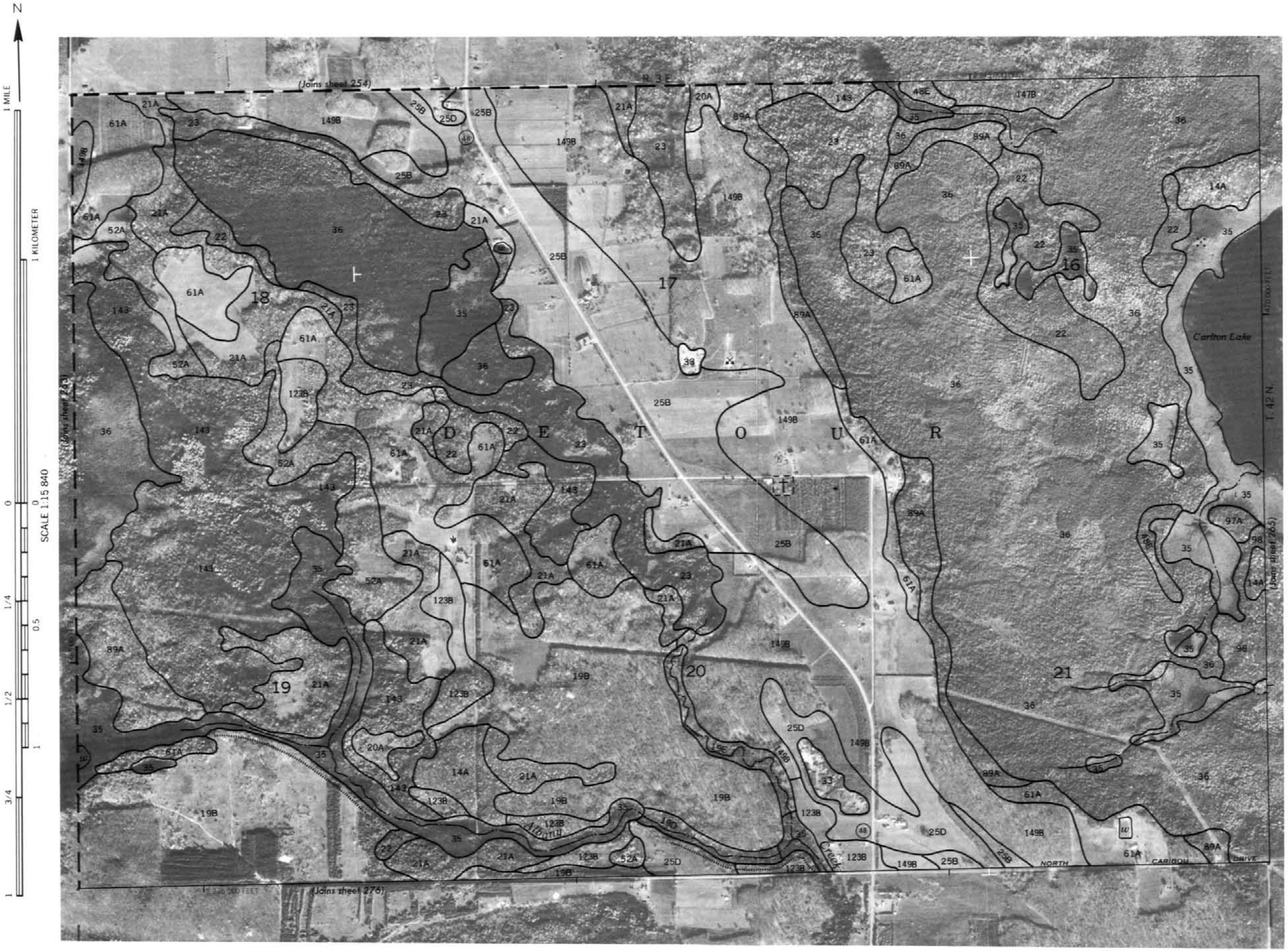
CHIPPEWA COUNTY, MICHIGAN NO. 262

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 263


N
(Joins sheet 253)
(Joins sheet 262)
(Joins sheet 264)
(Joins sheet 275)
R. 2 E.
T. 42 N.
15
14
13
22
23
24
R A B E R
McAdams Lake
Foreman Lake
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
19B
21A
22
23
35
36
41D
44D
52A
53B
61A
67B
88A
89A
94A
135B
147B
149B
19D
19E
20A


N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
SCALE 1:15 840
(Joins sheet 254)
(Joins sheet 276)
(Joins sheet 263)
(Joins sheet 265)
R. 3 E.
T. 42 N.
D E T O U R
Carlton Lake
NORTH CARIBOU DRIVE
Albany Creek
48
16
17
18
19
20
21
14A
19B
20A
21A
22
23
25B
25D
33
35
36
38
48E
52A
61A
89A
97A
98
123B
143
147B
149B
w

CHIPPEWA COUNTY, MICHIGAN NO. 264

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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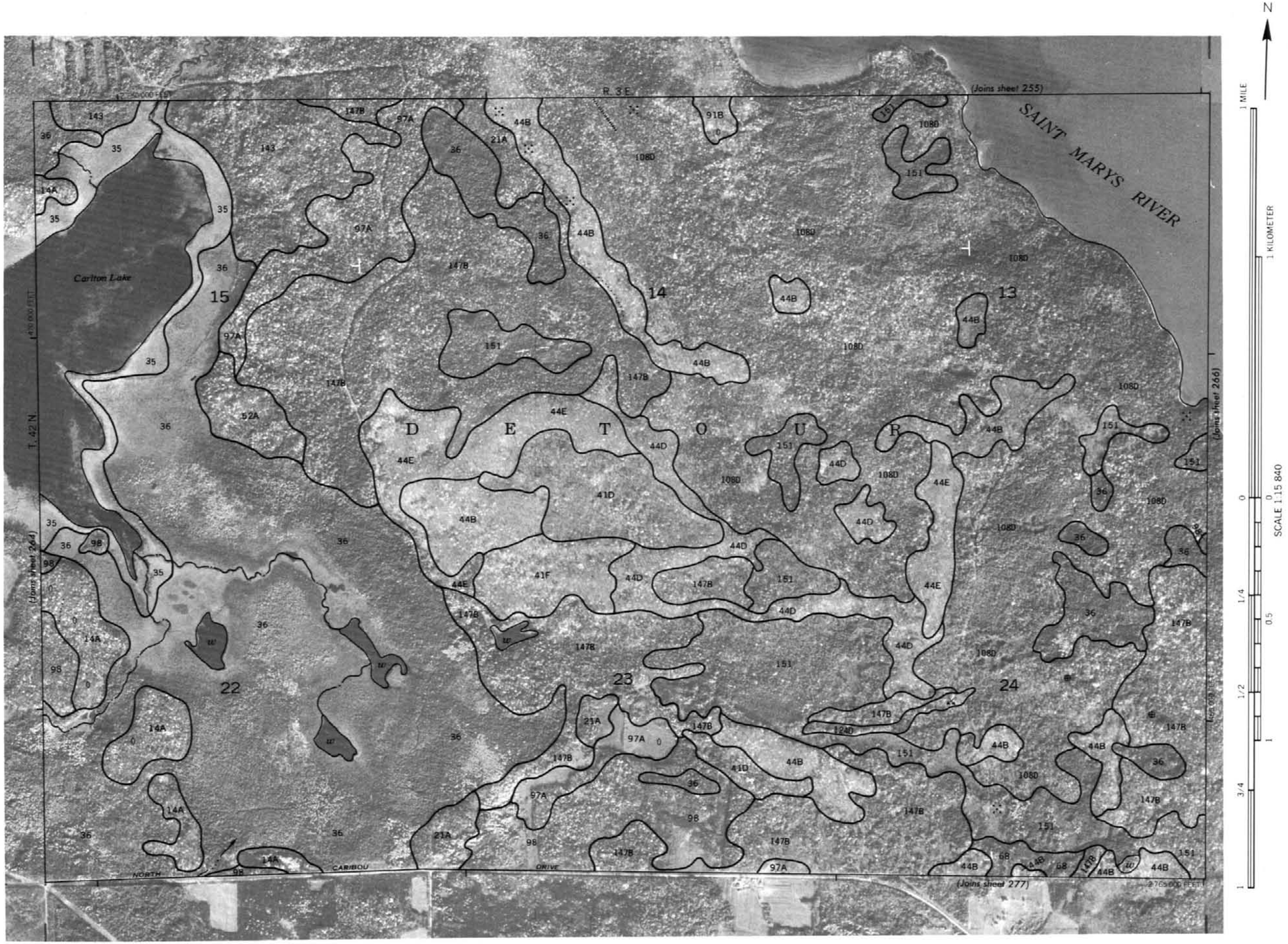
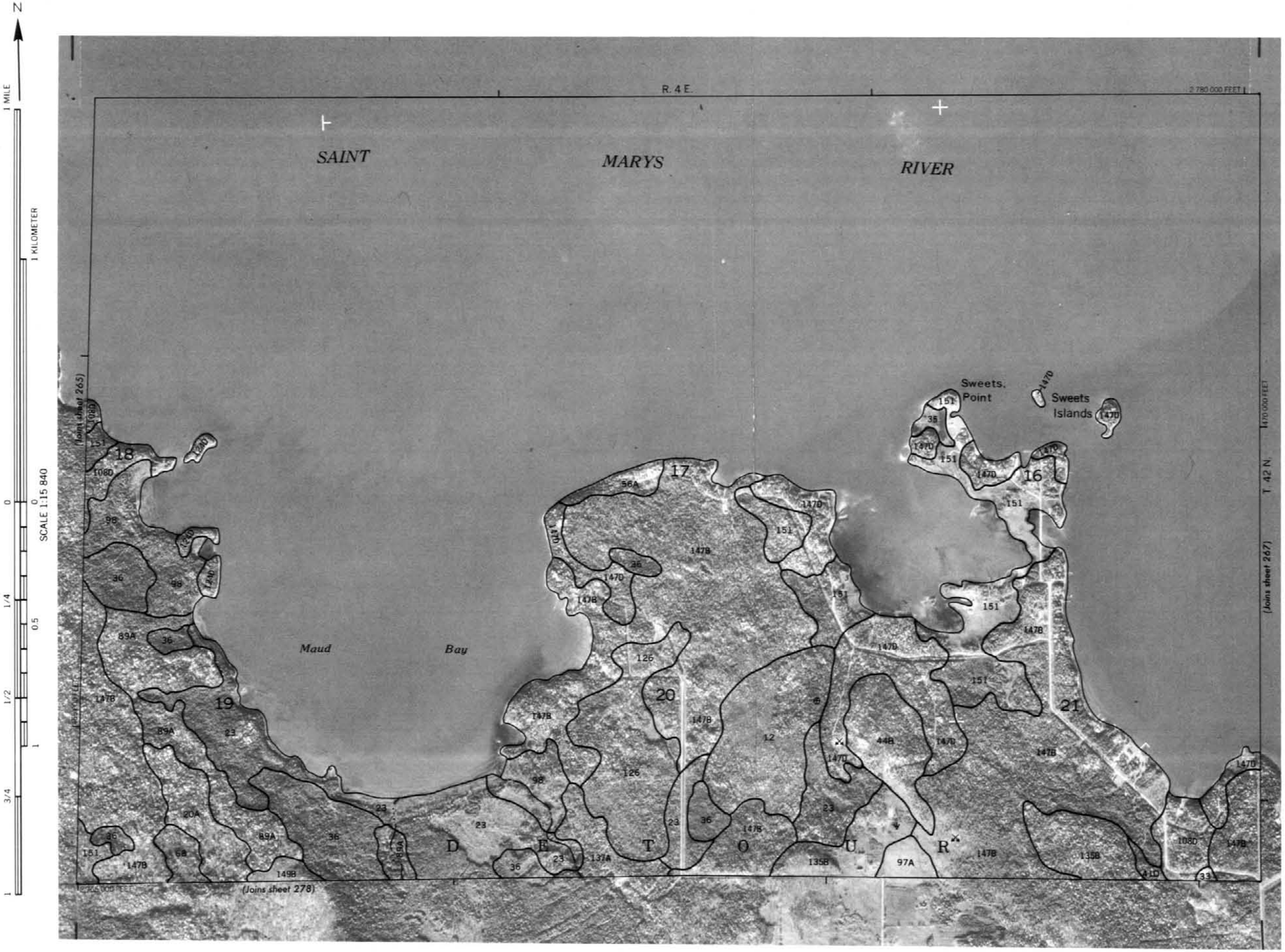
CHIPPEWA COUNTY, MICHIGAN NO. 265


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
R. 3 E.
T. 42 N.
(Joins sheet 255)
(Joins sheet 266)
(Joins sheet 277)
(Joins sheet 264)
SAINT MARYS RIVER
Carlton Lake
D E T O U R
NORTH CARIBOU DRIVE
15
14
13
22
23
24
36
35
14A
143
147B
97A
21A
44B
91B
108D
151
52A
44E
41D
41F
44D
98
w
68

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 266

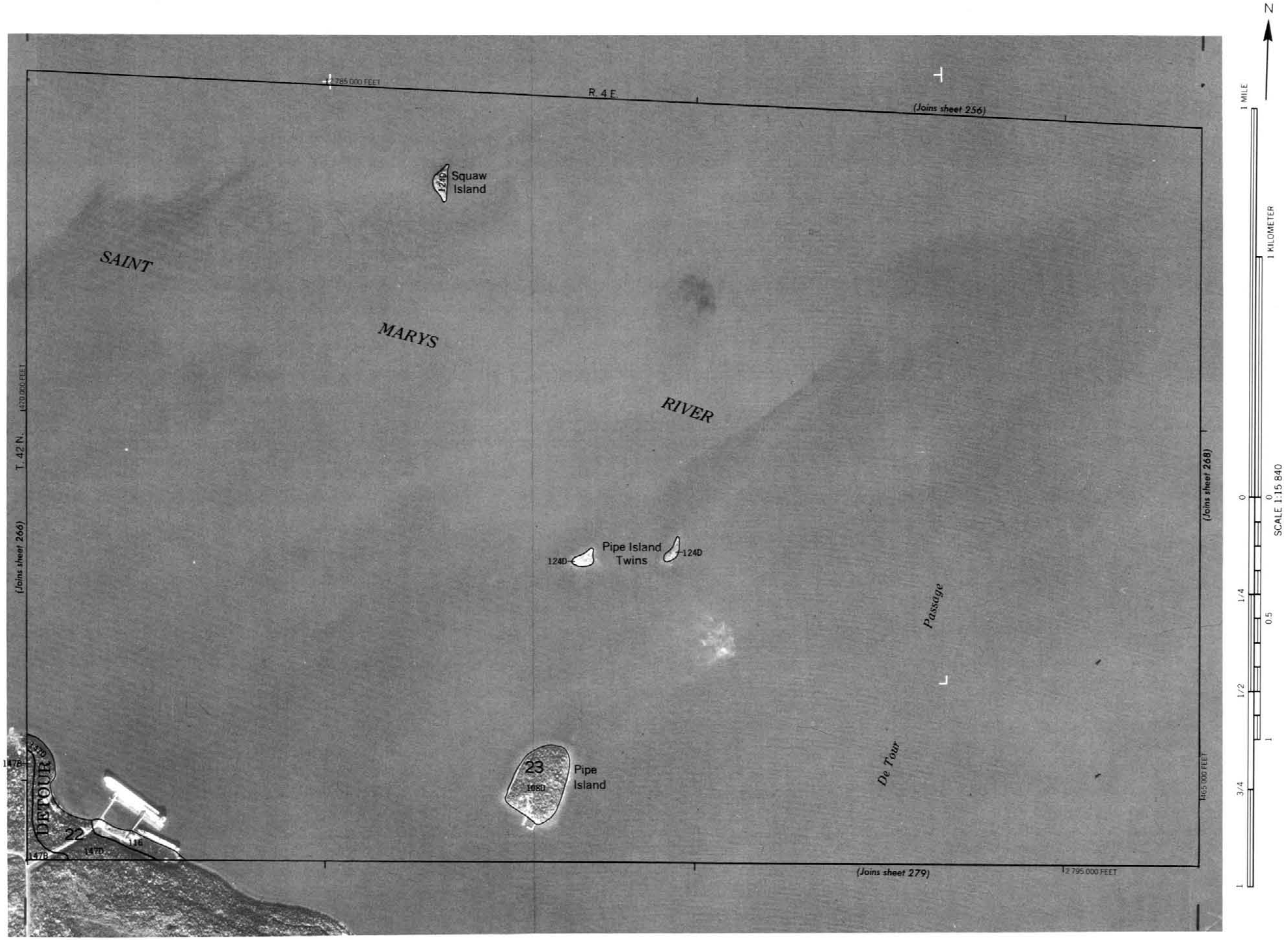

N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0
0.5
1
SCALE 1:15 840
R. 4 E.
2 780 000 FEET
SAINT
MARYS
RIVER
Sweets Point
Sweets Islands
Maud
Bay
T. 42 N.
470 000 FEET
(Joins sheet 265)
(Joins sheet 267)
(Joins sheet 278)
16
17
18
19
20
21
D
E
T
O
U
R
151
36
147D
147B
108D
98
89A
20A
23
6B
149B
56A
126
12
44B
135B
97A
137A
33
41D

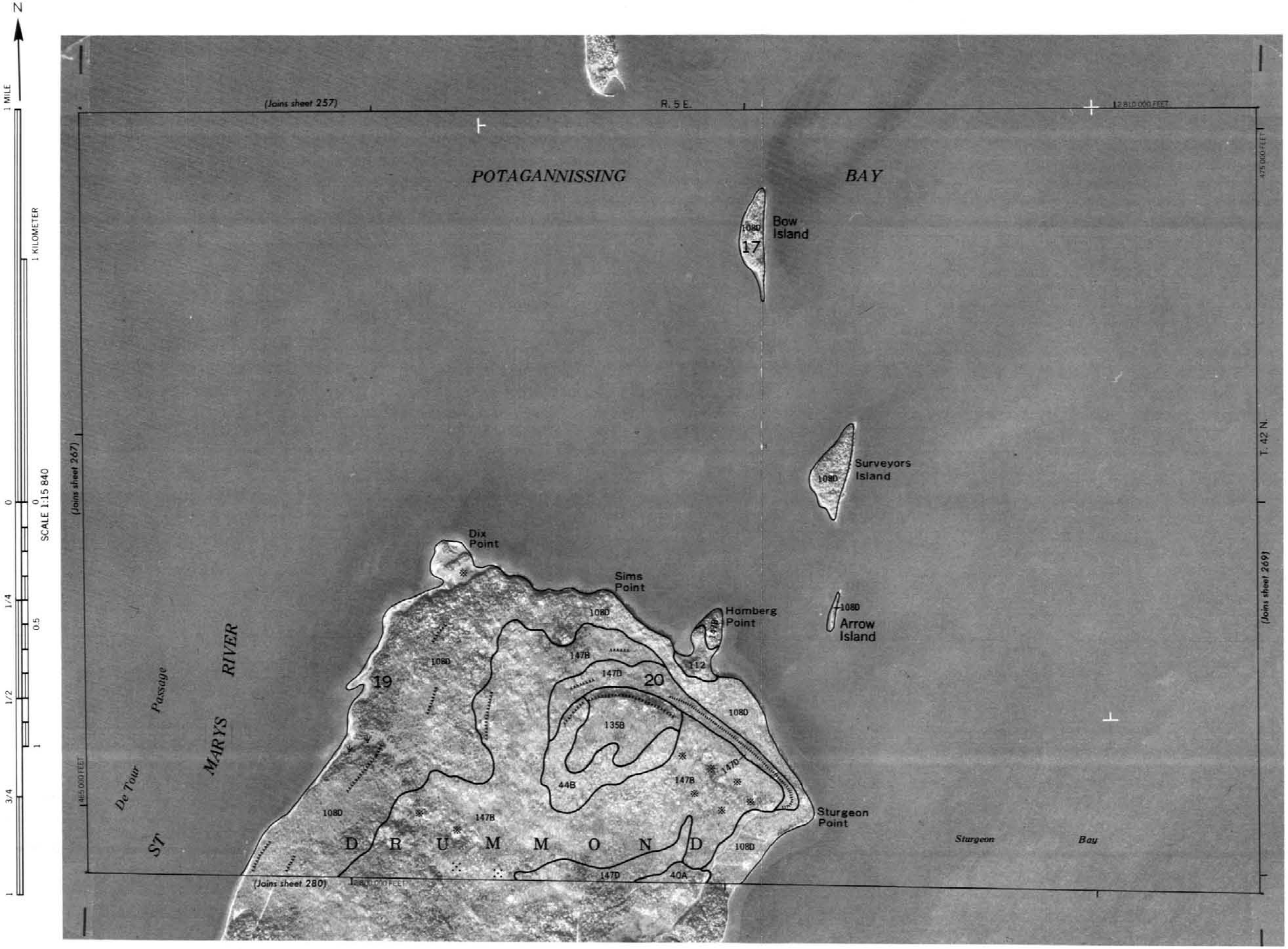
CHIPPEWA COUNTY, MICHIGAN NO. 266

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from **1981 - 1983** aerial photography. Coordinate **grid** ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 267


N
2 785 000 FEET
R. 4 E.
(Joins sheet 256)
Squaw Island
124D
SAINT
MARYS
RIVER
470 000 FEET
T. 42 N.
(Joins sheet 266)
(Joins sheet 268)
Pipe Island Twins
124D
124D
Passage
De Tour
23
108D
Pipe Island
DETOUR
22
147D
147B
147D
147B
116
465 000 FEET
(Joins sheet 279)
2 795 000 FEET
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 257)
R. 5 E.
2 810 000 FEET
475 000 FEET
POTAGANNISSING
BAY
108D
17
Bow Island
Surveyors Island
108D
T. 42 N.
(Joins sheet 269)
108D
Arrow Island
Homberg Point
Dix Point
Sims Point
108D
108D
147B
147D
20
112
19
135B
108D
44B
147B
147D
108D
147B
Sturgeon Point
Sturgeon
Bay
D R U M M O N D
108D
147D
40A
(Joins sheet 280)
2 800 000 FEET
(Joins sheet 267)
465 000 FEET
ST MARYS RIVER
De Tour Passage

CHIPPEWA COUNTY, MICHIGAN NO. 268

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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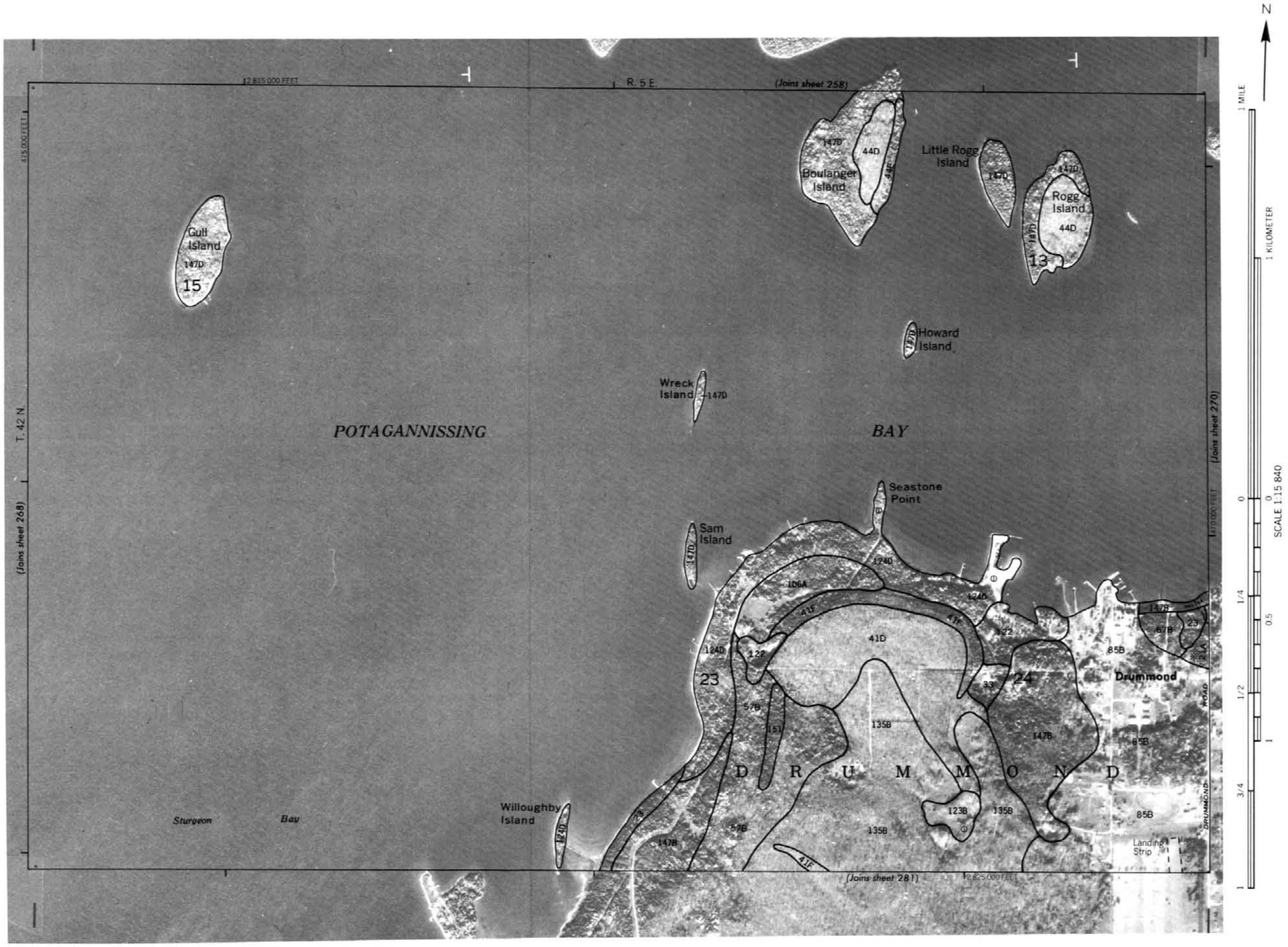
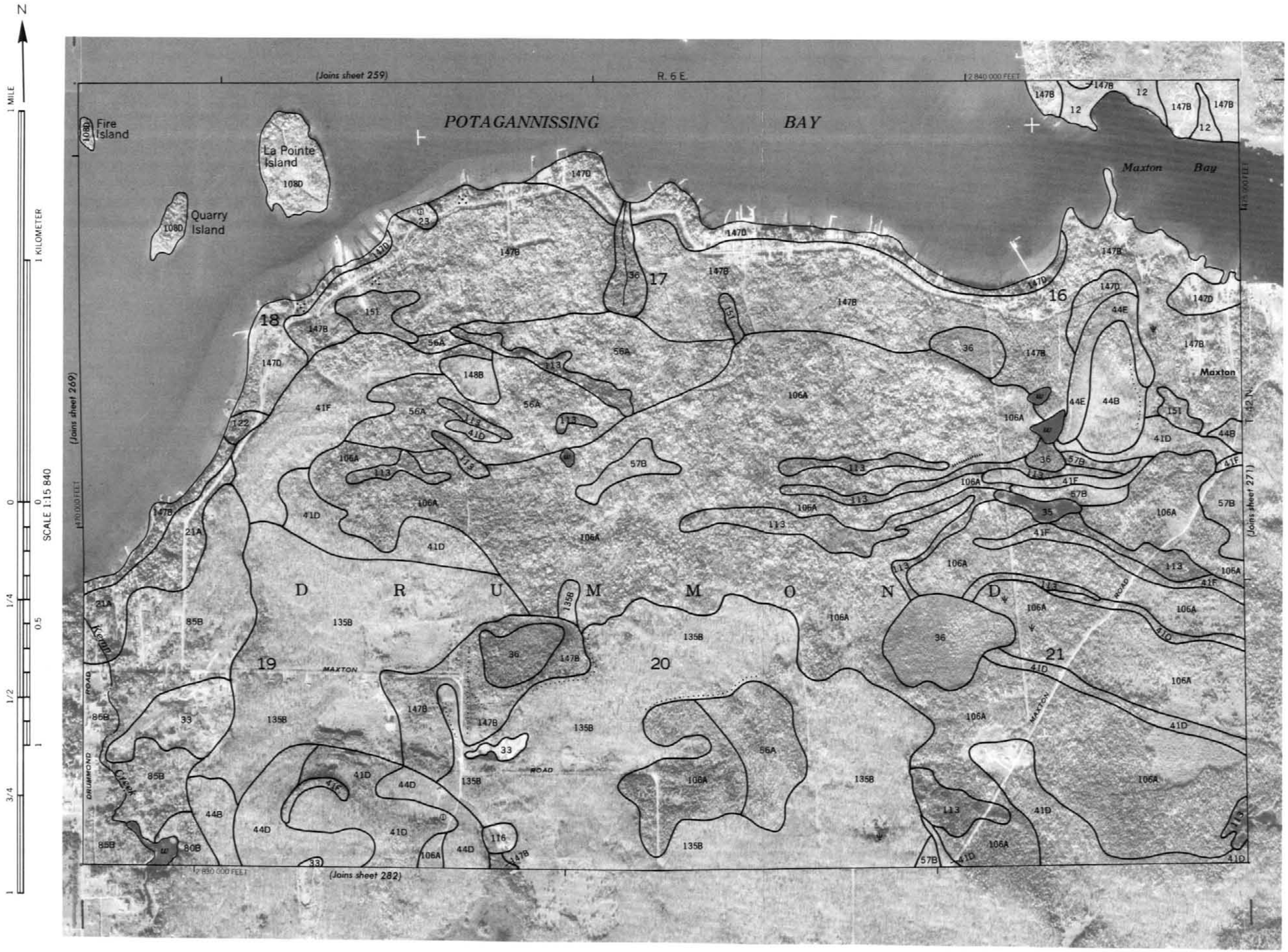
CHIPPEWA COUNTY, MICHIGAN NO. 269

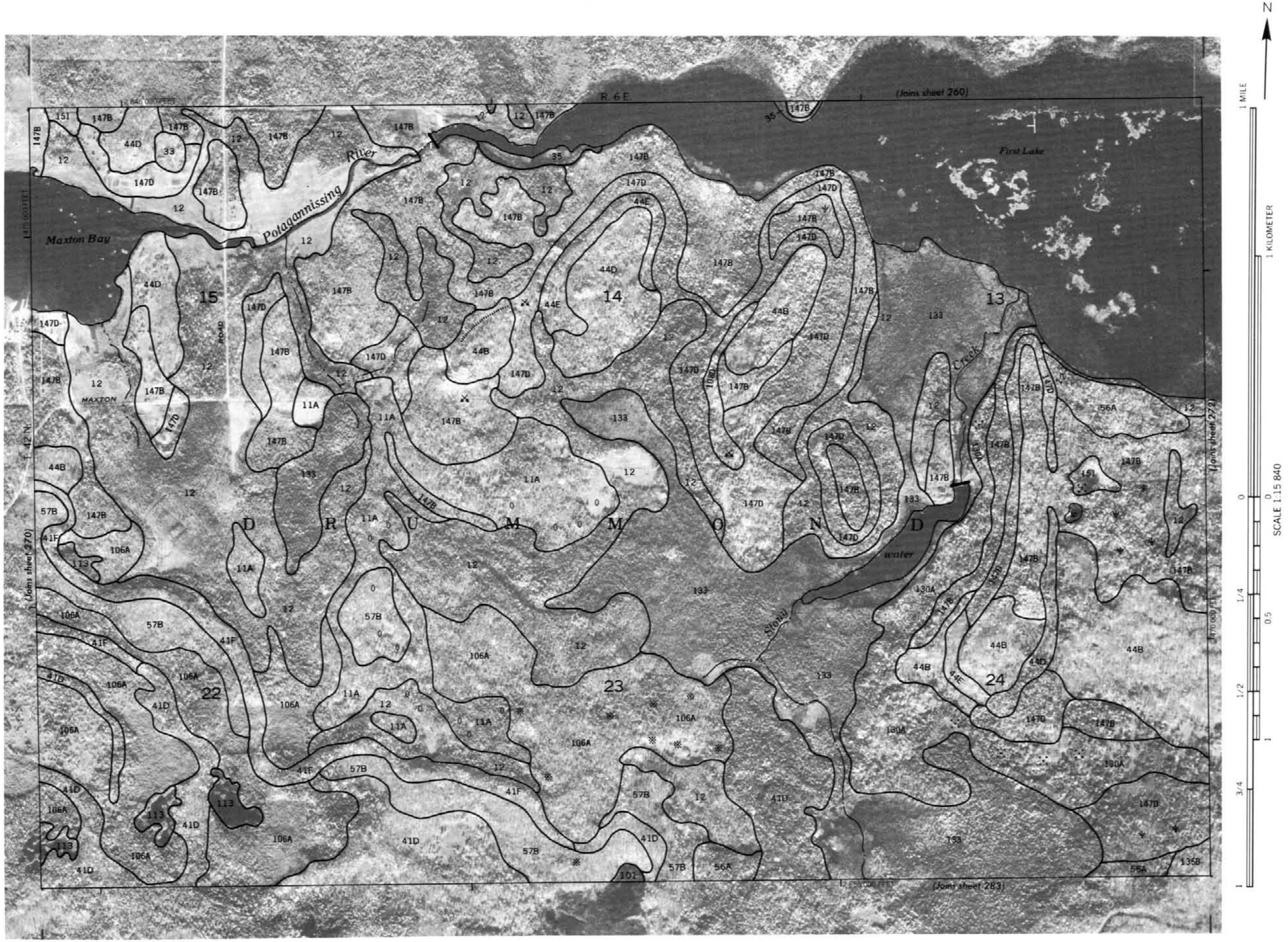

N
(Joins sheet 258)
R. 5 E.
2 815 000 FEET
475 000 FEET
T. 42 N.
(Joins sheet 268)
(Joins sheet 270)
(Joins sheet 281)
2 825 000 FEET
POTAGANNISSING
BAY
Gull Island
147D
15
Boulanger Island
44D
44F
Little Rogg Island
Rogg Island
13
Howard Island
Wreck Island
Seastone Point
Sam Island
Willoughby Island
Sturgeon
Bay
D R U M M O N D
Drummond
23
24
106A
124D
41F
41D
122
33
57B
151
135B
123B
147B
85B
67B
Landing Strip
DRUMMOND ROAD
1 MILE
1/4
1/2
3/4
1
0
1 KILOMETER
0.5
SCALE 1:15 840

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 270


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
0.5
1/2
1
3/4
1
(Joins sheet 259)
R. 6 E.
2 840 000 FEET
(Joins sheet 269)
470 000 FEET
475 000 FEET
T. 42 N.
(Joins sheet 271)
(Joins sheet 282)
2 830 000 FEET
POTAGANNISSING
BAY
Maxton Bay
Maxton
Fire Island
La Pointe Island
Quarry Island
D R U M M O N D
MAXTON ROAD
DRUMMOND ROAD
Kemp Creek
16
17
18
19
20
21
108D
147B
147D
12
23
36
151
56A
113
148B
41F
41D
106A
57B
122
21A
85B
135B
44E
44B
35
33
80B
44D
116
w

CHIPPEWA COUNTY, MICHIGAN NO. 270

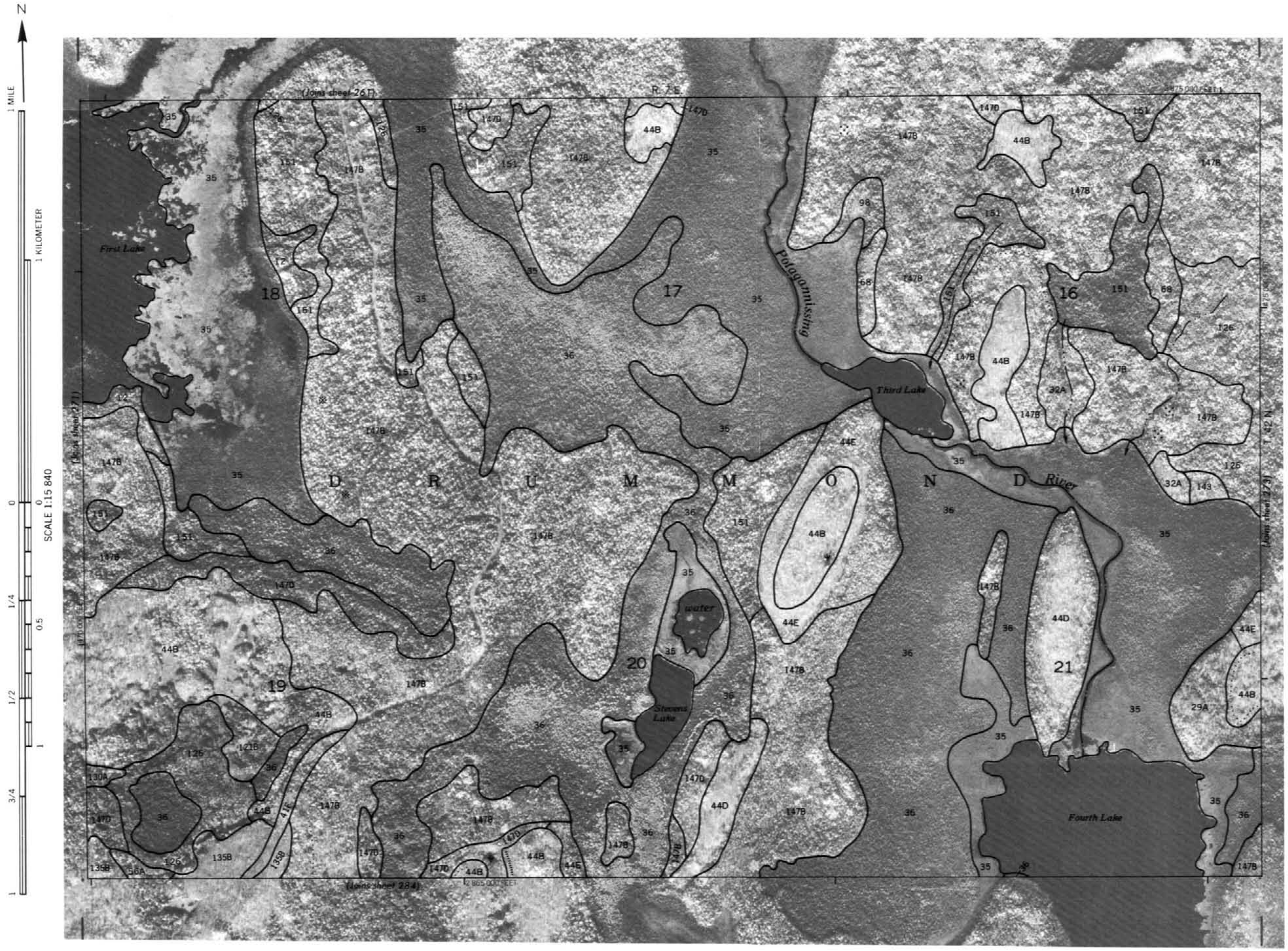
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
(Joins sheet 260)
(Joins sheet 270)
(Joins sheet 272)
(Joins sheet 283)
R. 6 E.
T. 42 N.
Maxton Bay
MAXTON
ROAD
Polaganissing River
First Lake
Creek
Stony
water
D R U M M O N D
13
14
15
22
23
24
11A
12
33
35
41D
41F
44B
44D
44E
56A
57B
101
106A
113
130A
133
135B
147B
147D
151
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 271

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 272


N
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840
(Joins sheet 267)
(Joins sheet 271)
(Joins sheet 273)
(Joins sheet 284)
R. 7 E.
T. 42 N.
First Lake
Third Lake
Fourth Lake
Stevens Lake
water
Potagannissing
River
D R U M M O N D
16
17
18
19
20
21
35
36
44B
44D
44E
147B
147D
151
126
12
29A
32A
68
98
121B
130A
135B
143
161
56A

CHIPPEWA COUNTY, MICHIGAN NO. 272

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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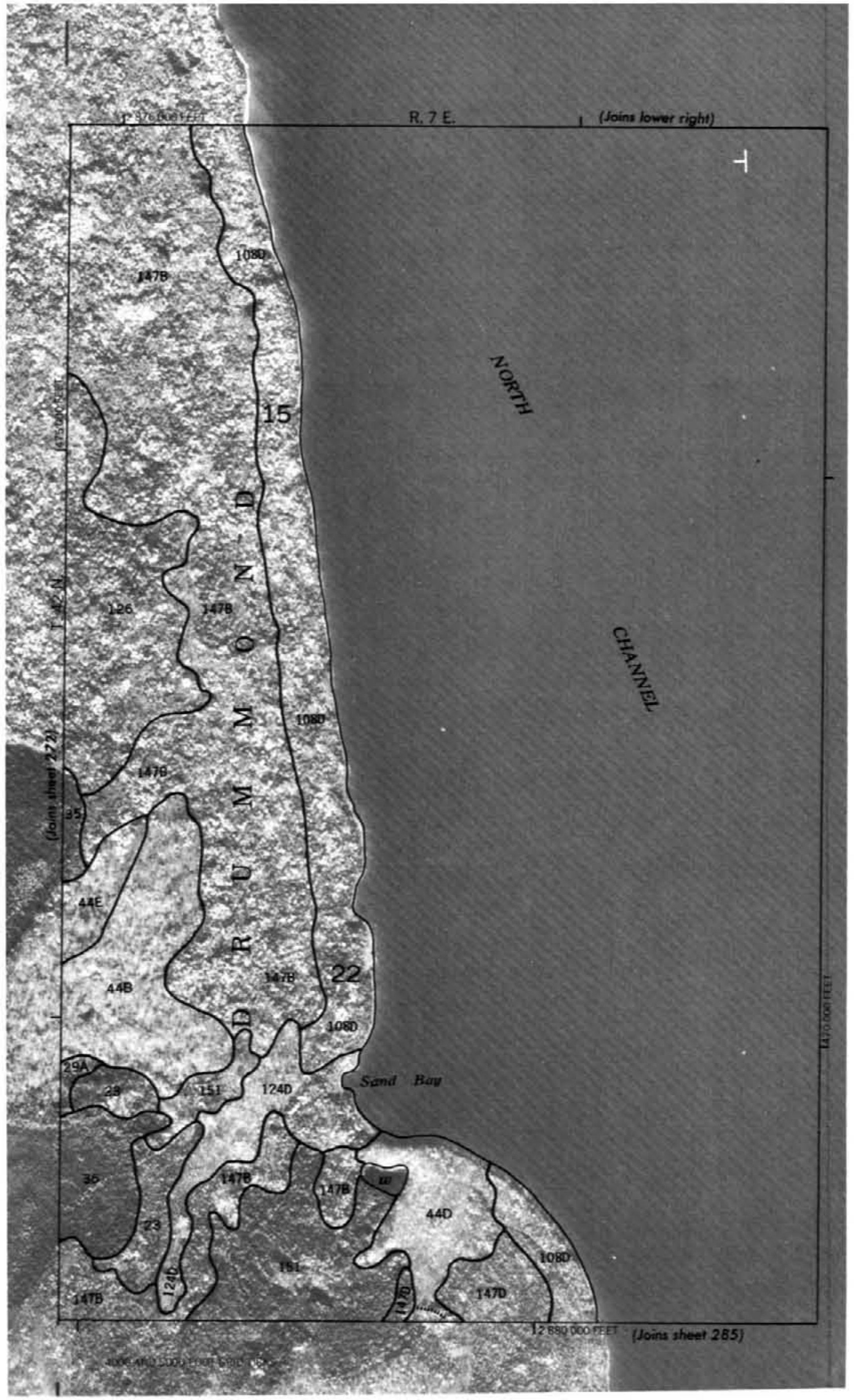
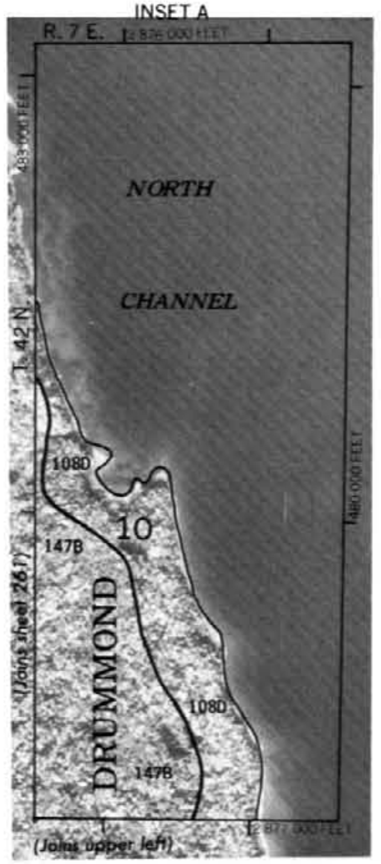
CHIPPEWA COUNTY, MICHIGAN NO. 273

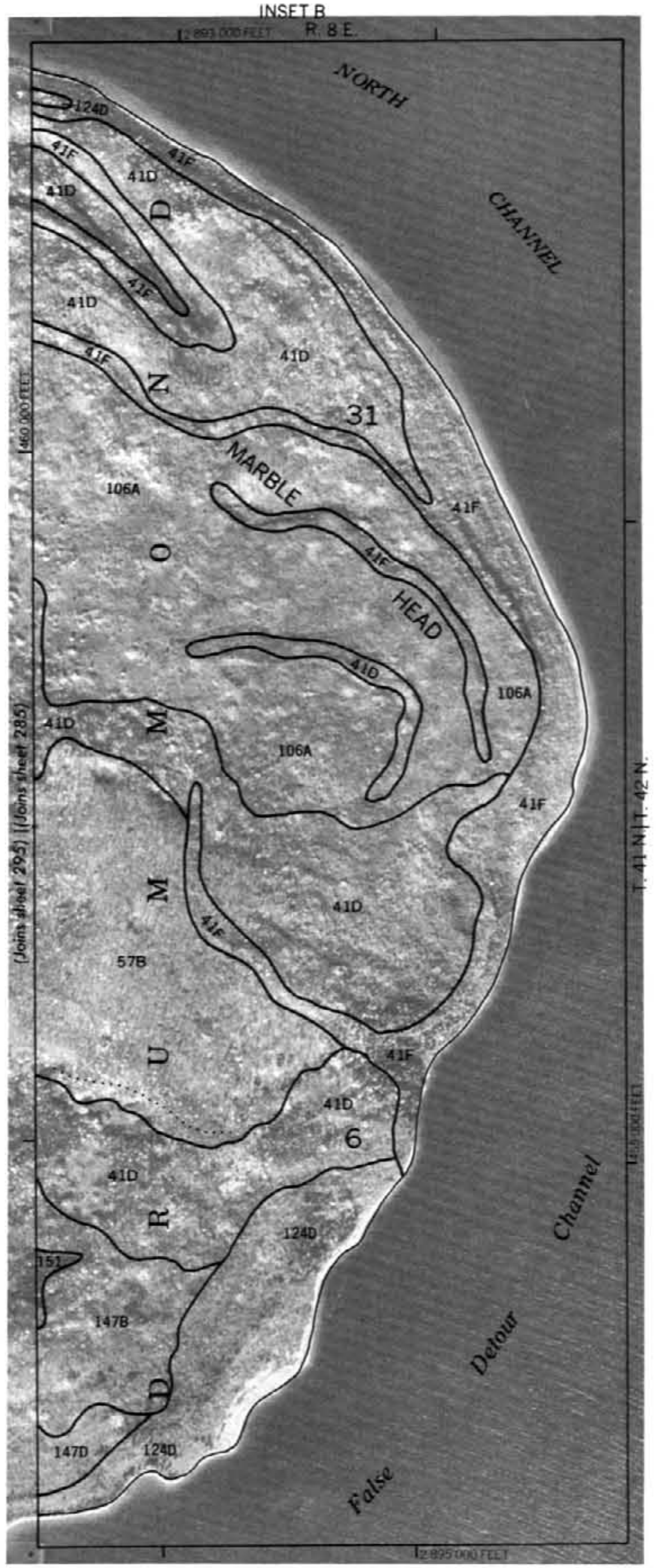

R. 7 E.
(Joins lower right)
T. 42 N.
(Joins sheet 272)
(Joins sheet 285)
NORTH
CHANNEL
DRUMMOND
15
22
Sand Bay
108D
147B
126
147B
35
44E
44B
29A
29
151
124D
36
23
124D
147D
44D
108D
4000 AND 5000-FOOT GRID TICKS

INSET A


R. 7 E.
T. 42 N.
NORTH
CHANNEL
10
DRUMMOND
108D
147B
(Joins sheet 281)
(Joins upper left)

1000 AND 3000-FOOT GRID TICKS

INSET B


R. 8 E.
NORTH
CHANNEL
DRUMMOND
MARBLE
HEAD
31
6
124D
41F
41D
106A
57B
151
147B
147D
(Joins sheet 295)
(Joins sheet 285)
T. 41 N.
T. 42 N.
False
Detour
Channel

2000 AND 5000-FOOT GRID TICKS

N

1 MILE

1/4

1/2

3/4

1

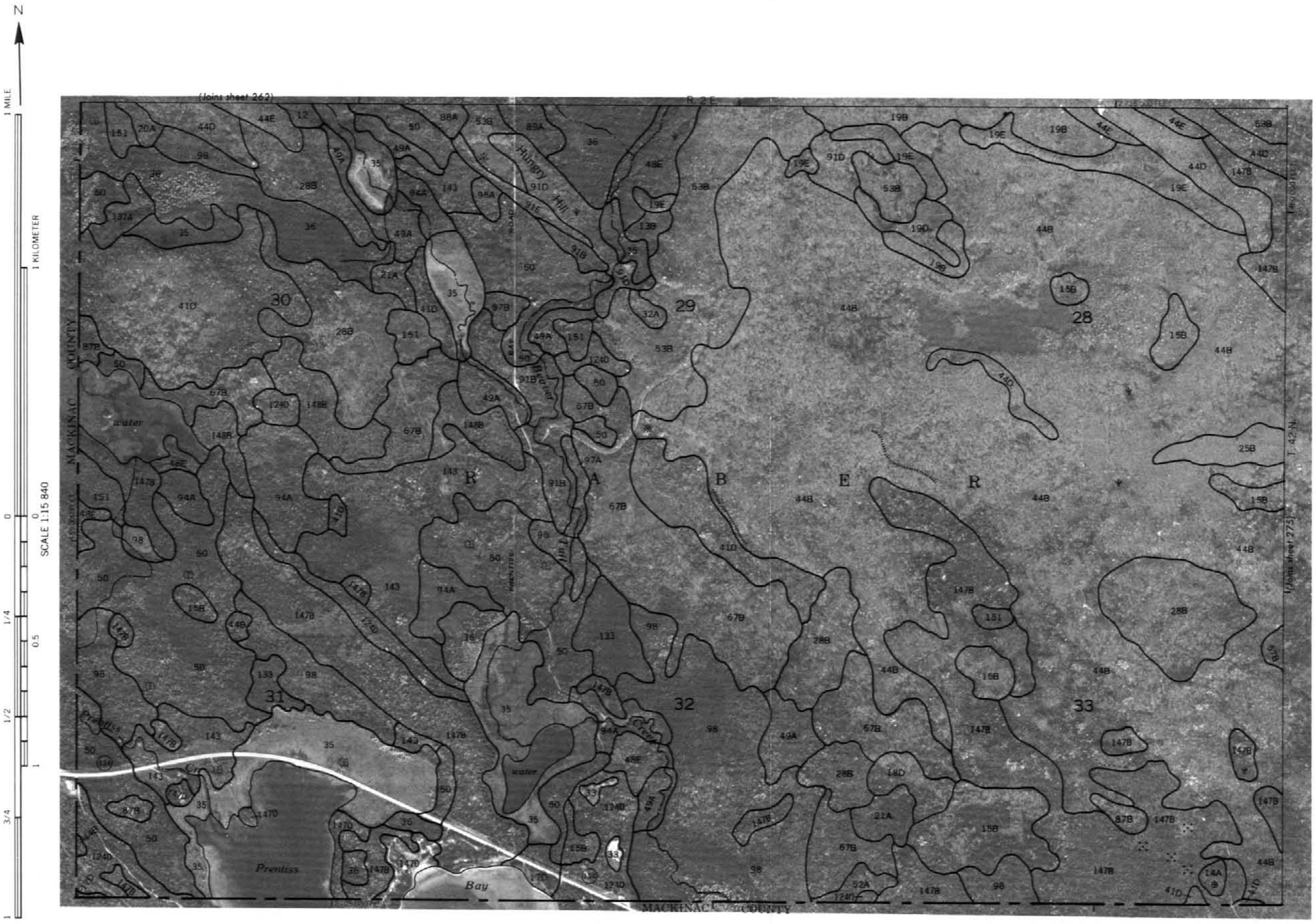
0

1 KILOMETER

0.5

SCALE 1:15 840

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 274


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
(Joins sheet 262)
R. 2 E.
(Joins sheet 275)
T. 42 N.
MACKINAC COUNTY
MACKINAC COUNTY
R A B E R
28
29
30
31
32
33
Hungry Hill
ROAD
water
water
Prentiss Cr.
Prentiss
Bay
151
20A
44D
44E
12
50
88A
53B
89A
36
98
49A
35
28B
94A
143
95A
91D
91E
91B
48E
19E
13B
37A
21A
41D
87B
32A
44B
19B
15B
25B
124D
148B
67B
97A
133
147B
147D
48E
98
16D
57B
52A
14A
61C

CHIPPEWA COUNTY, MICHIGAN NO. 274

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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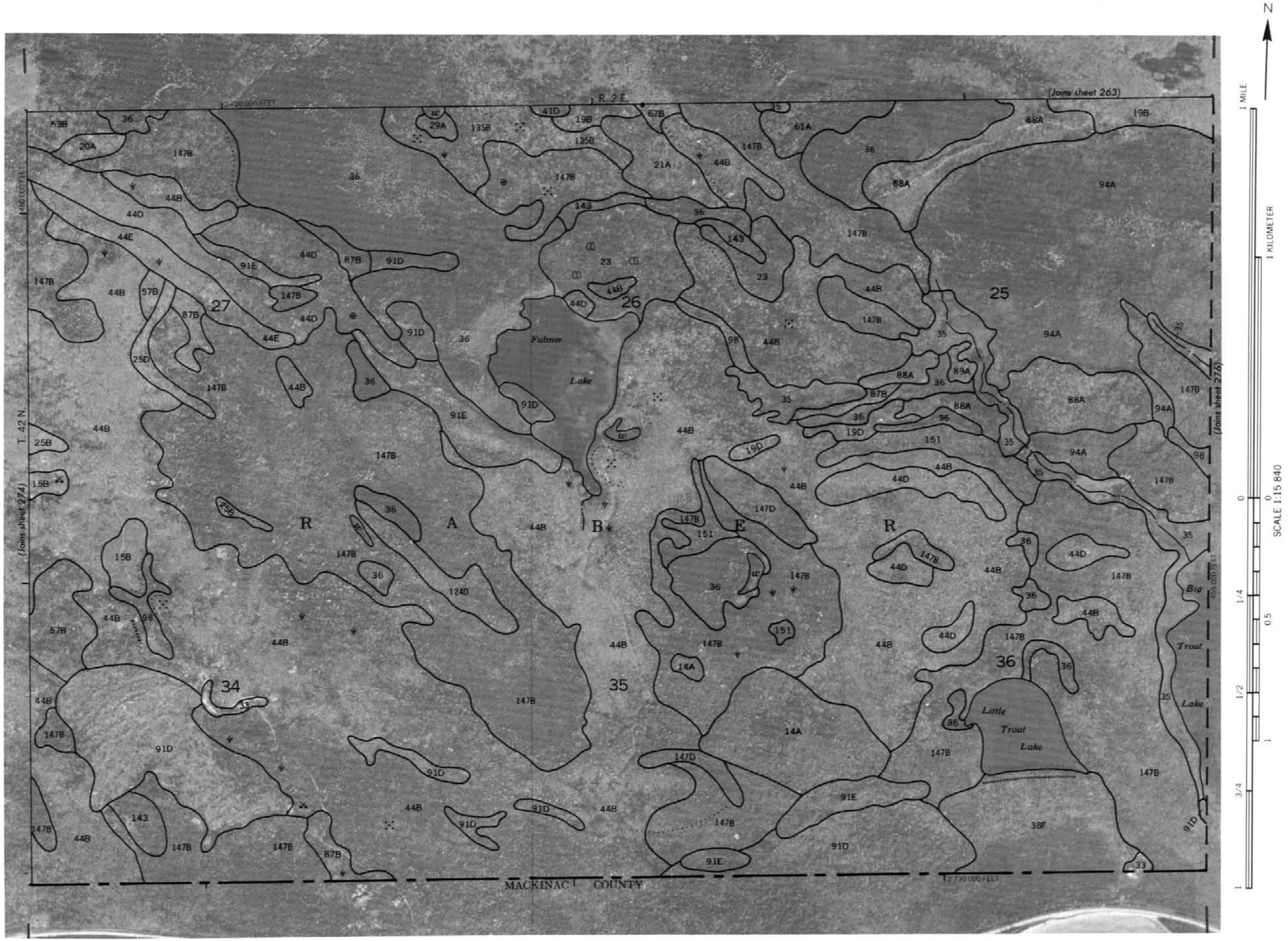
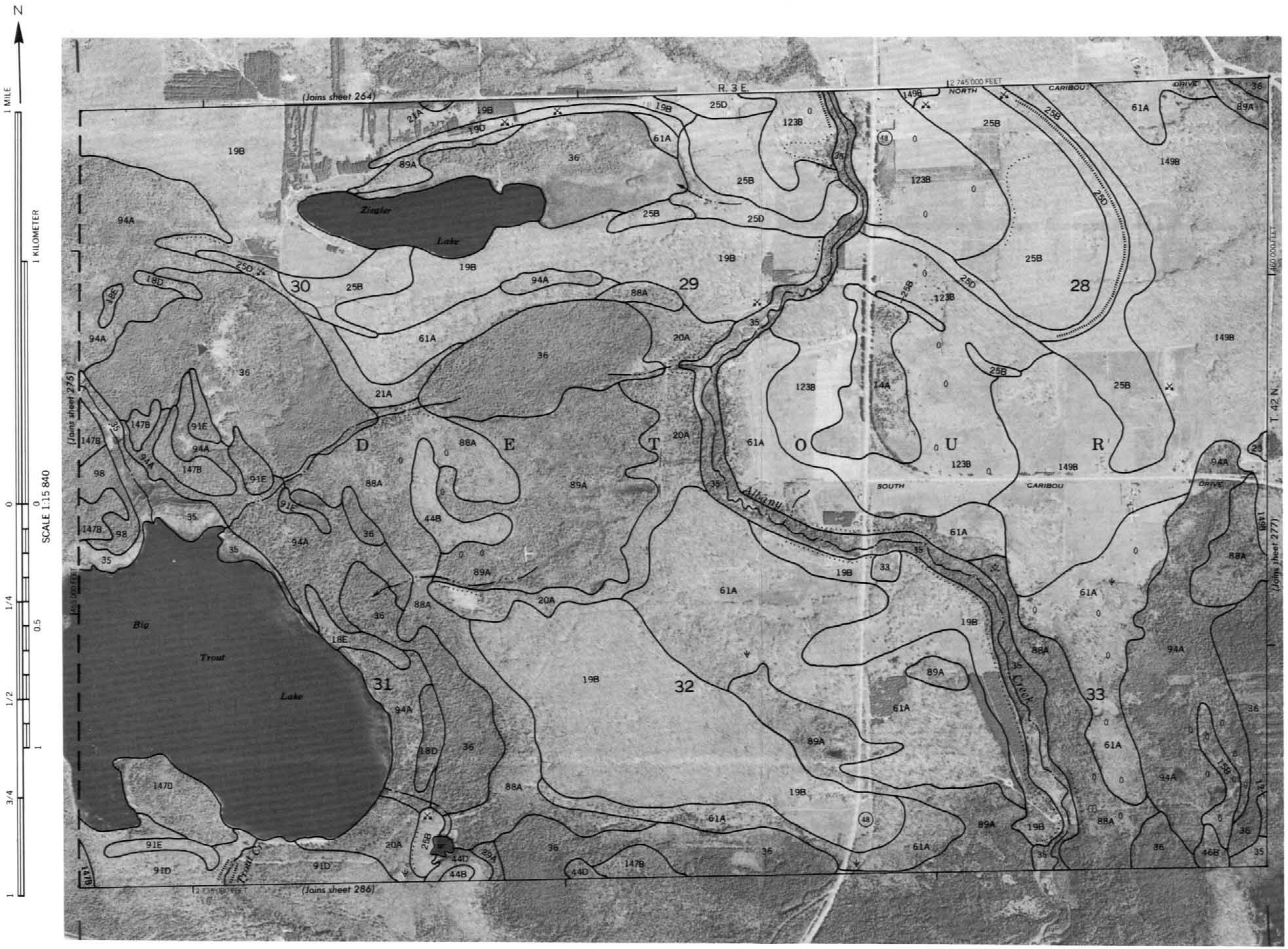
CHIPPEWA COUNTY, MICHIGAN NO. 275


N
(Joins sheet 263)
(Joins sheet 274)
(Joins sheet 276)
R. 2 E.
T. 42 N.
2 720 000 FEET
2 730 000 FEET
MACKINAC COUNTY
R A B E R
27
26
25
34
35
36
Fulmer Lake
Little Trout Lake
Big Trout Lake
53B
36
20A
147B
44B
44D
44E
91E
57B
87B
25D
15B
25B
98
91D
143
33
29A
135B
41D
19B
67B
21A
61A
88A
94A
23
44D
91D
124D
14A
151
147D
89A
19D
35
38F
91E
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 276

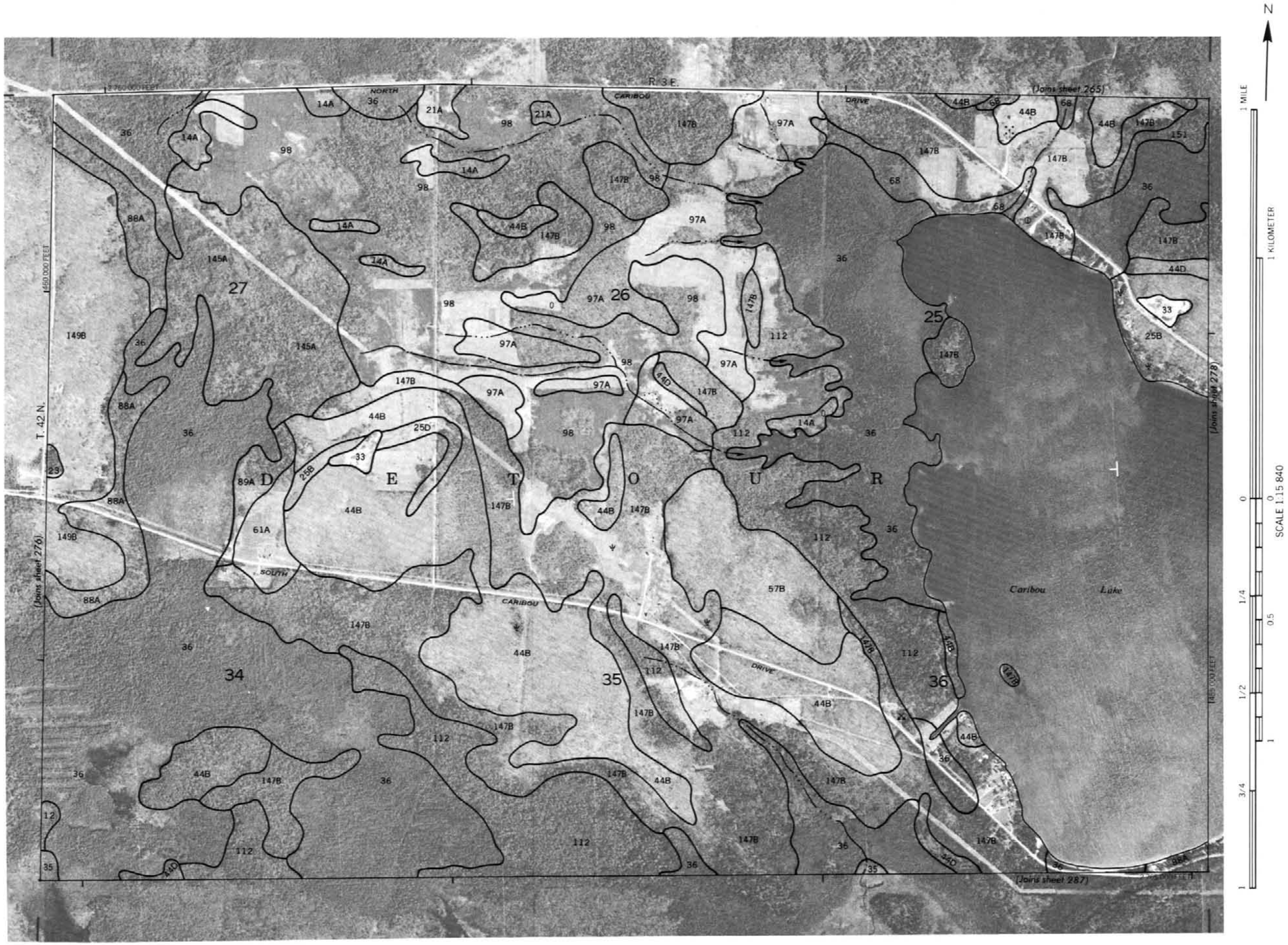

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 264)
(Joins sheet 275)
(Joins sheet 277)
(Joins sheet 286)
R. 3 E.
T. 42 N.
2 745 000 FEET
460 000 FEET
Ziegler Lake
Big Trout Lake
Albany Creek
Trout Cr.
NORTH CARIBOU DRIVE
SOUTH CARIBOU DRIVE
48
D E T O U R
28
29
30
31
32
33
19B
19D
21A
25B
25D
61A
36
89A
94A
18D
18E
123B
149B
88A
20A
35
14A
147B
91E
98
44B
44D
147D
91D
33
23
46B
13B
0

CHIPPEWA COUNTY, MICHIGAN NO. 276

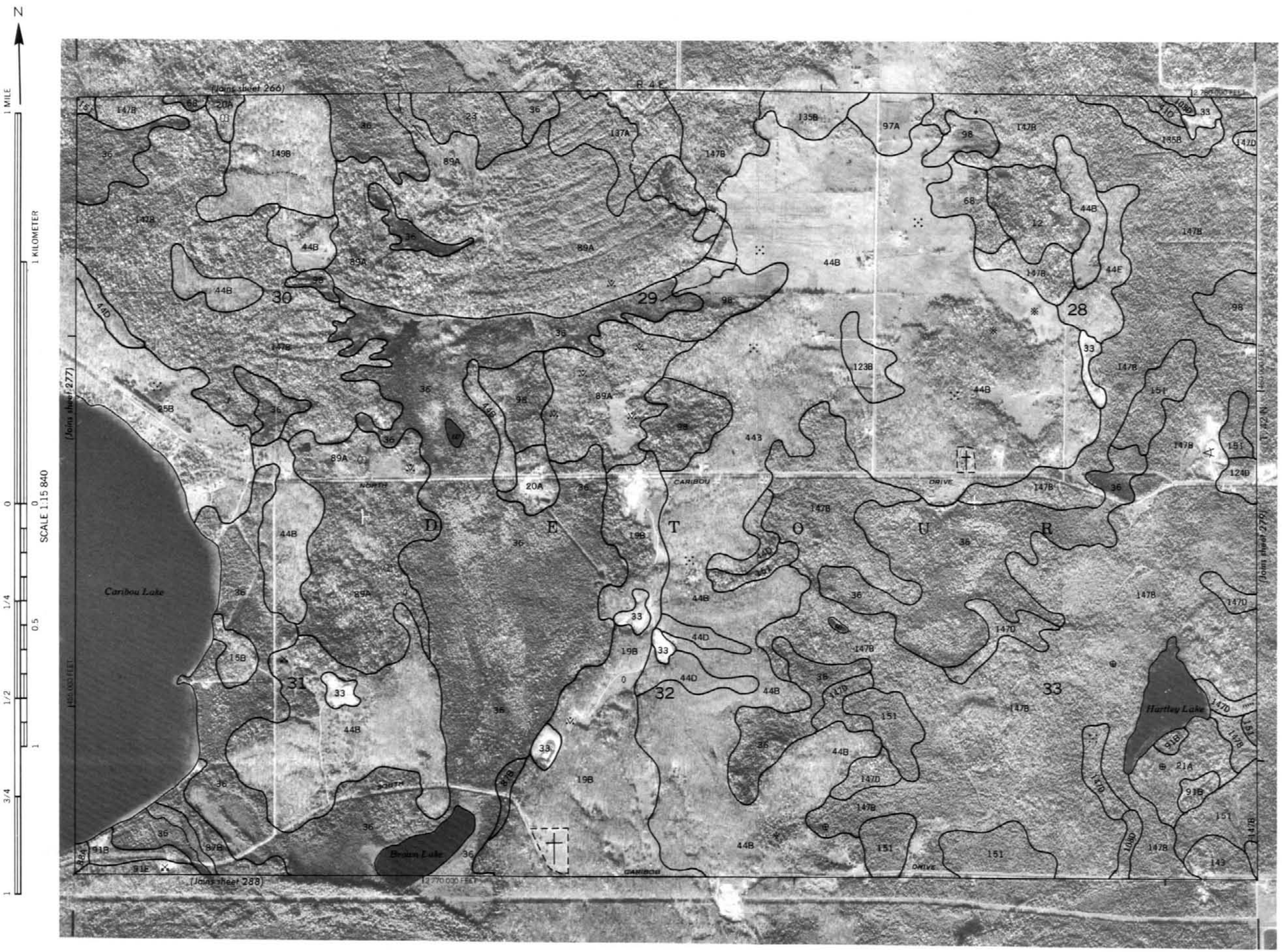
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 277


N
R. 3 E.
T. 42 N.
(Joins sheet 265)
(Joins sheet 276)
(Joins sheet 278)
(Joins sheet 287)
2 750 000 FEET
460 000 FEET
465 000 FEET
NORTH CARIBOU DRIVE
SOUTH CARIBOU DRIVE
DETOUR
Caribou Lake
27
26
25
34
35
36
14A
36
21A
98
21A
147B
97A
44B
68
151
88A
145A
149B
44D
33
25B
147B
112
14D
97A
57B
61A
89A
44B
25D
25B
33
12
35
36D
14D
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 278


N
1 MILE
1 KILOMETER
0
0
SCALE 1:15 840
1/4
0.5
1/2
1
3/4
1
(Joins sheet 266)
R. 4 E.
(Joins sheet 277)
(Joins sheet 279)
(Joins sheet 288)
T. 42 N.
Caribou Lake
Brown Lake
Hartley Lake
NORTH
CARIBOU
DRIVE
CARIBOU
DRIVE
NORTH
D
E
T
O
U
R
28
29
30
31
32
33
147B
20A
36
23
137A
135B
97A
98
149B
89A
68
12
44B
44E
44D
123B
443
151
124B
20A
19B
33
44D
147D
15B
91B
91E
87B
21A
143
108D
2 770 000 FEET

CHIPPEWA COUNTY, MICHIGAN NO. 278

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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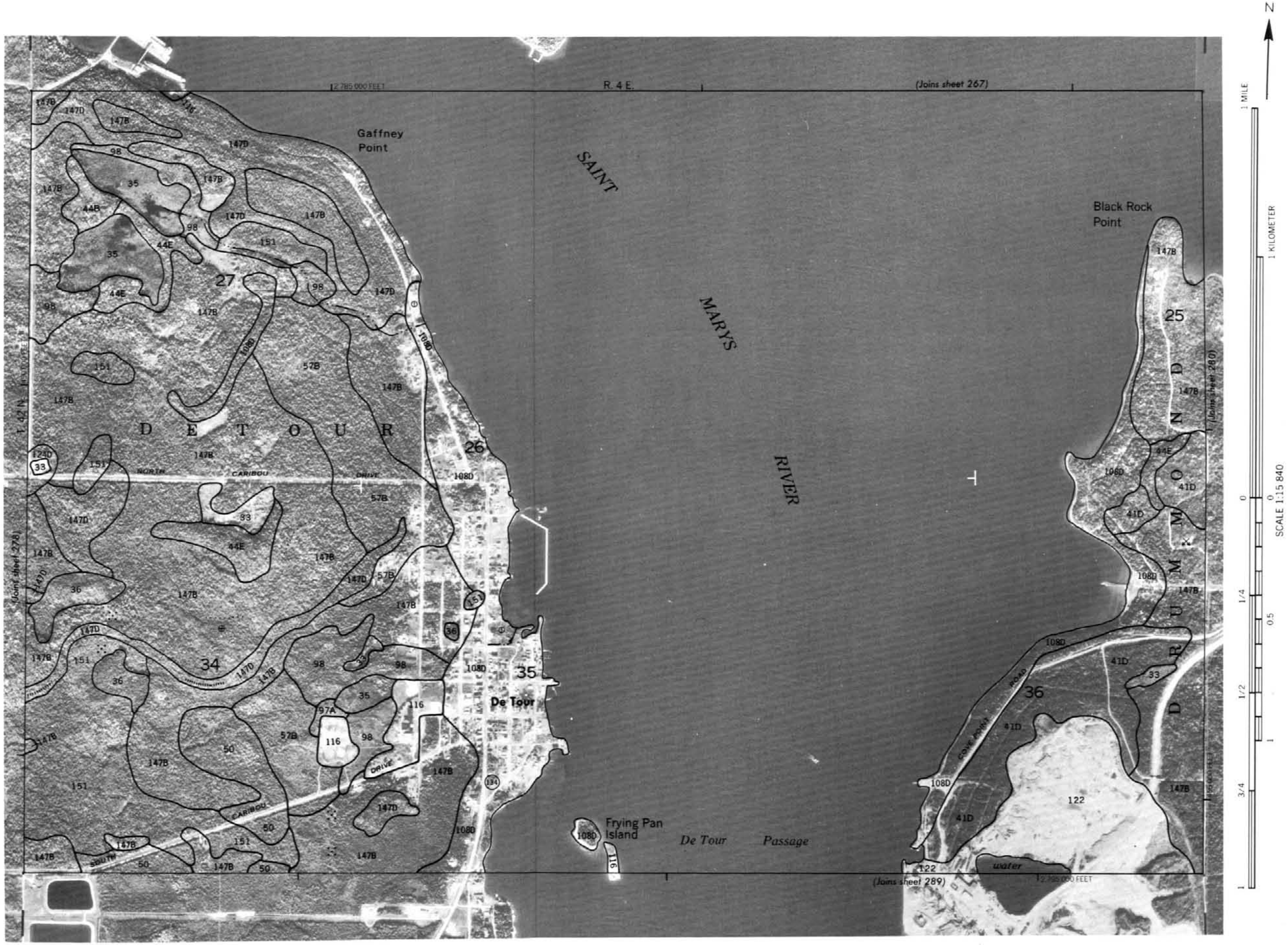
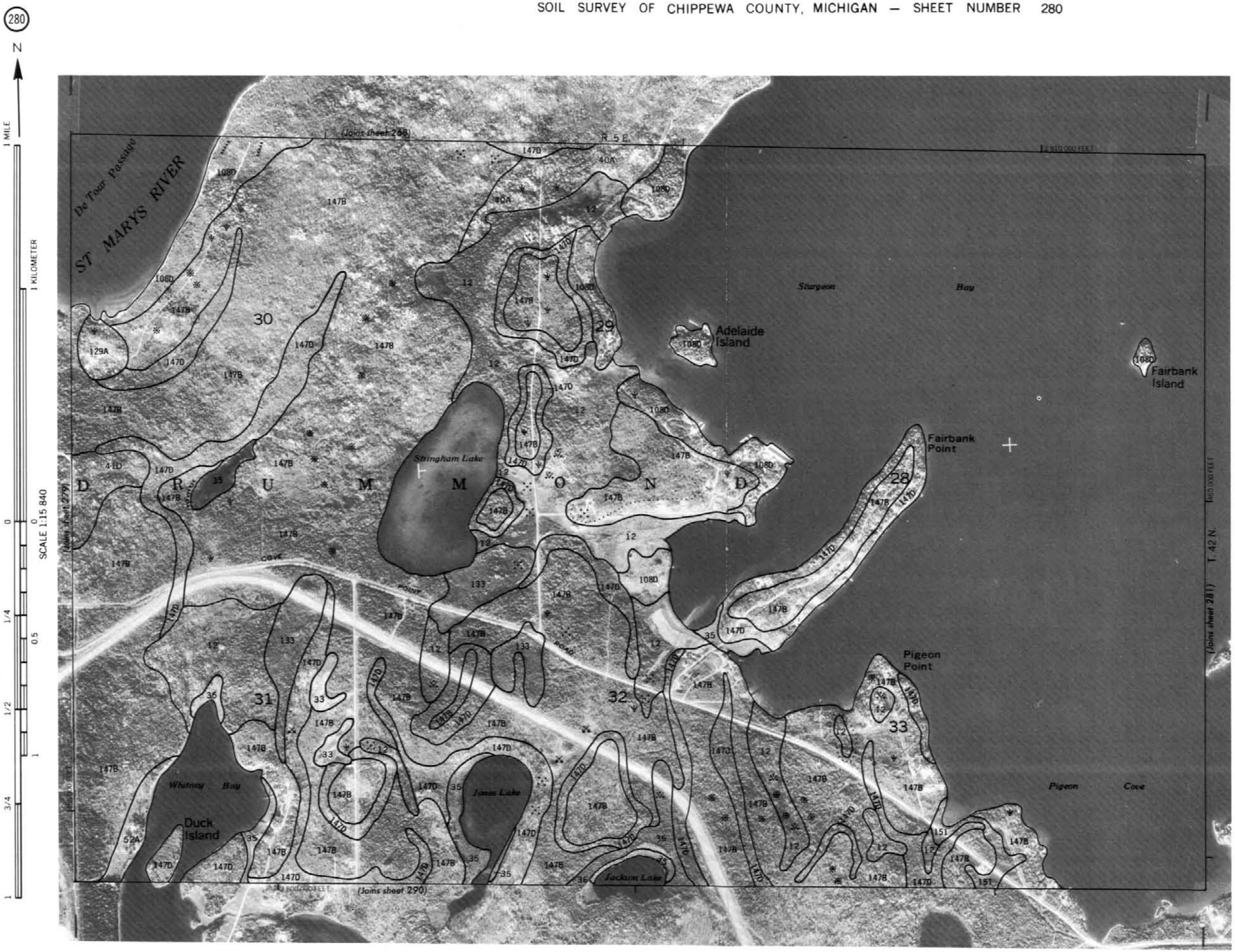
CHIPPEWA COUNTY, MICHIGAN NO. 279


N
2 785 000 FEET
R. 4 E.
(Joins sheet 267)
(Joins sheet 278)
(Joins sheet 280)
(Joins sheet 289)
T. 42 N.
Gaffney Point
SAINT
MARYS
RIVER
Black Rock Point
D E T O U R
D R U M M O N D
NORTH CARIBOU DRIVE
SOUTH CARIBOU DRIVE
DRIVE
POINT ROAD
De Tour
Frying Pan Island
De Tour Passage
water
27
26
34
35
25
36
33
134
147B
147D
98
35
44B
44E
151
57B
108D
36
93
97A
116
50
122
41D
33
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 280

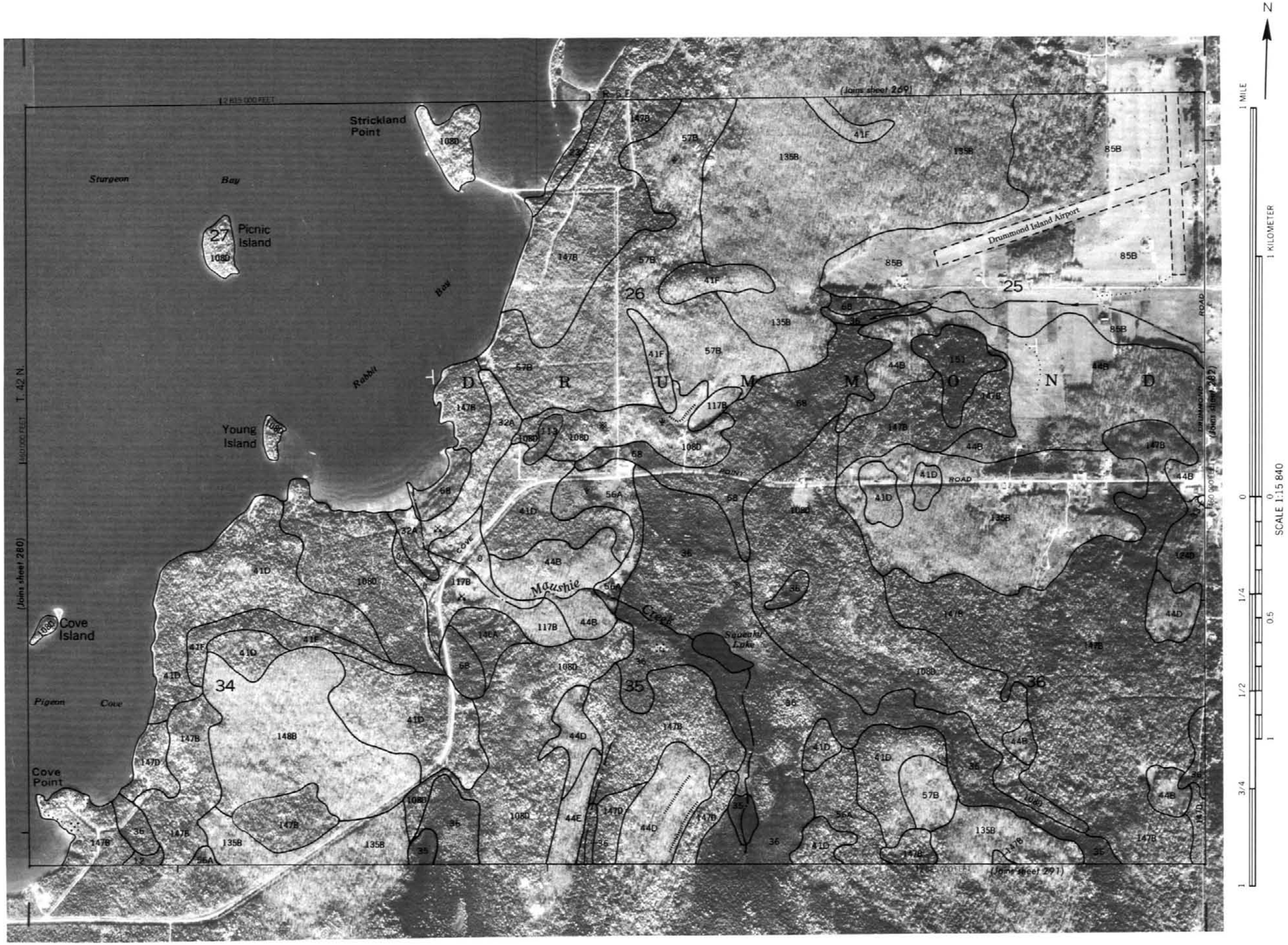

280
N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 268)
(Joins sheet 279)
(Joins sheet 281)
(Joins sheet 290)
R. 5 E.
T. 42 N.
2 810 000 FEET
De Tour Passage
ST MARYS RIVER
Sturgeon Bay
Adelaide Island
Fairbank Island
Fairbank Point
Pigeon Point
Pigeon Cove
Stringham Lake
Whitney Bay
Duck Island
Jones Lake
Jackson Lake
COVE POINT ROAD
D R U M M O N D
28
29
30
31
32
33
12
33
35
36
40A
41D
52A
108D
129A
133
147B
147D
151

CHIPPEWA COUNTY, MICHIGAN NO. 280

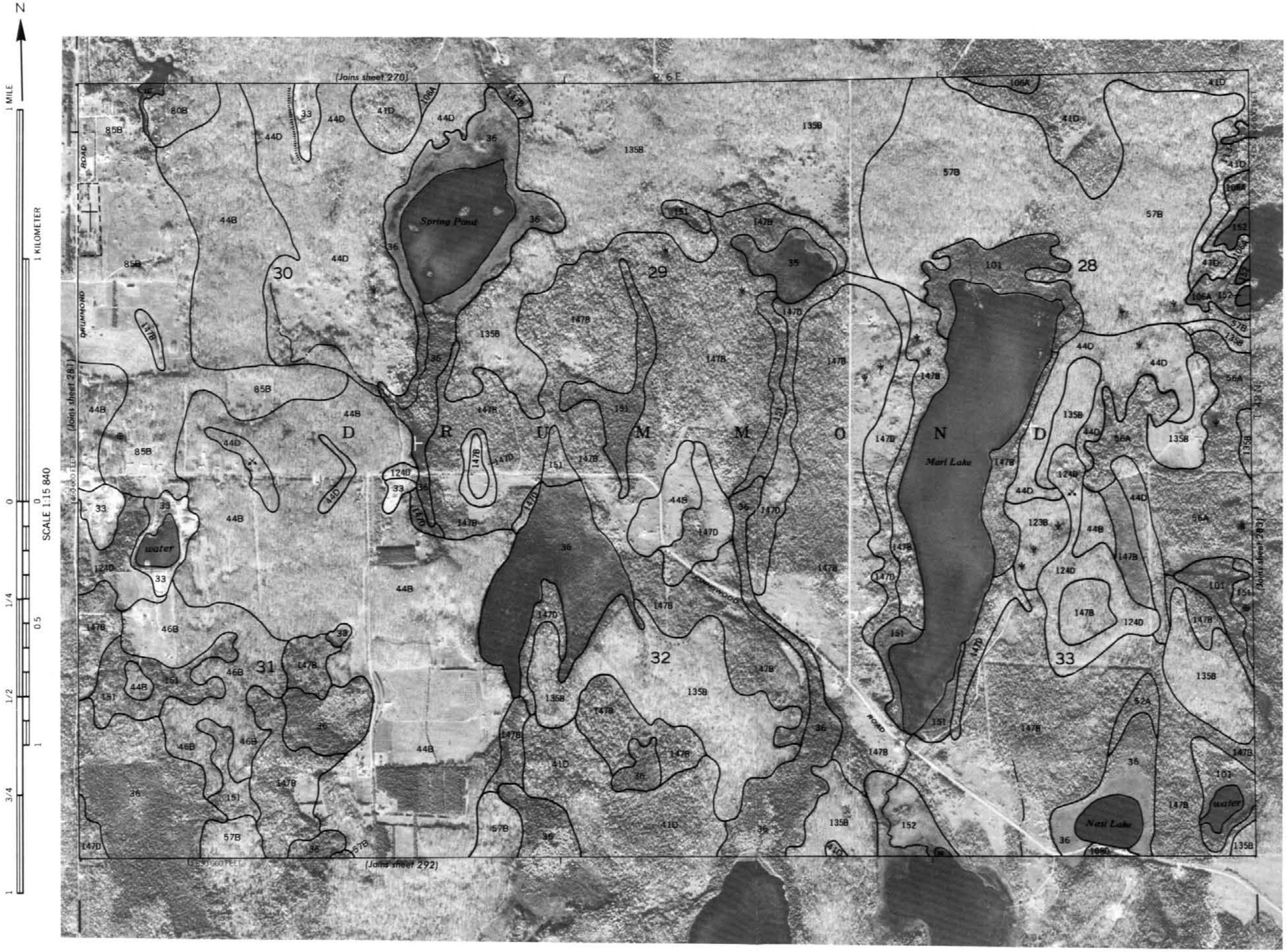
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 281

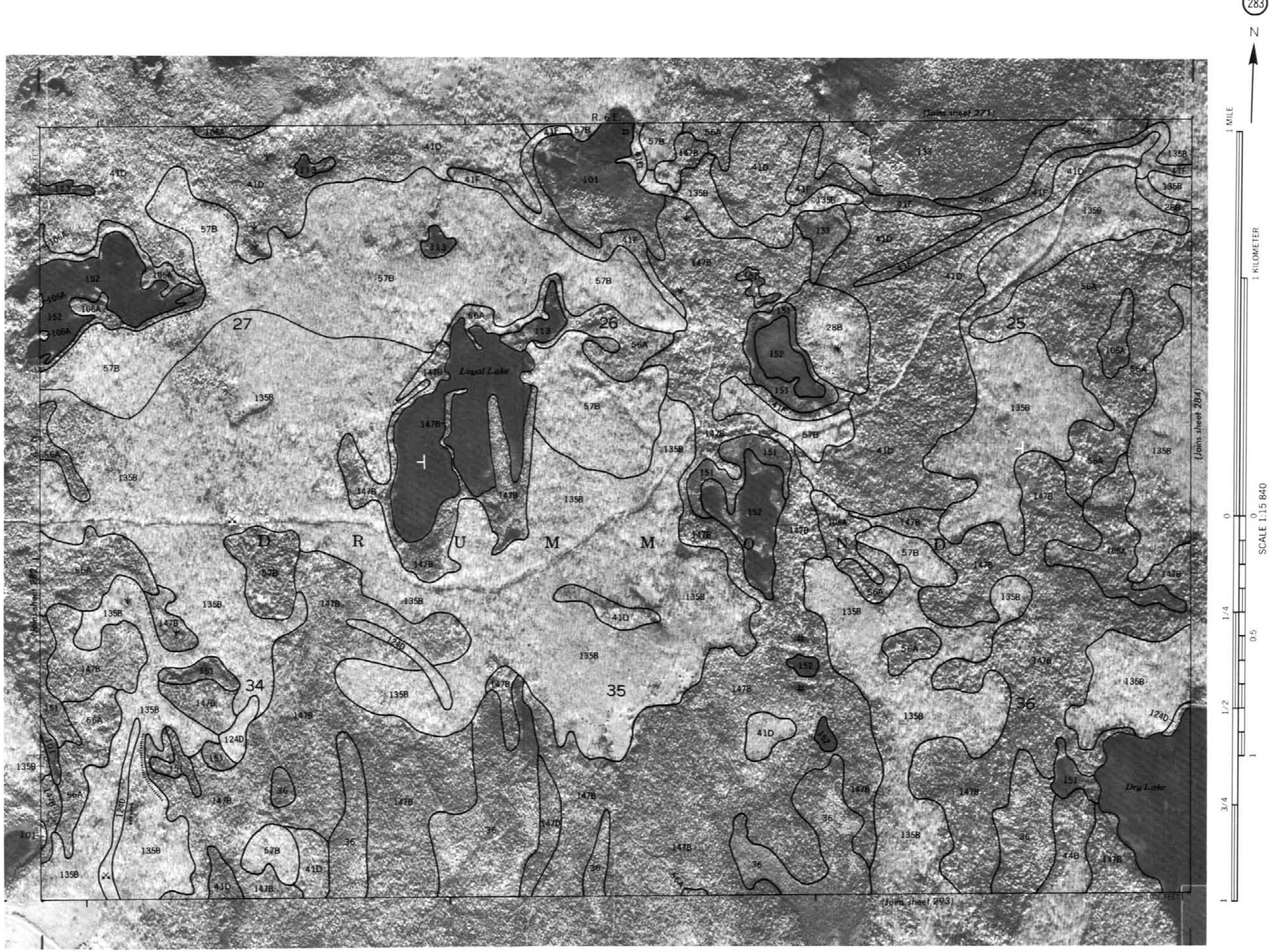

N
(Joins sheet 269)
(Joins sheet 280)
(Joins sheet 282)
(Joins sheet 291)
T. 42 N.
Strickland Point
Sturgeon Bay
Picnic Island
Rabbit Bay
Young Island
Cove Island
Pigeon Cove
Cove Point
Drummond Island Airport
D R U M M O N D
POINT ROAD
ROAD
COVE
Maushie Creek
Squeaky Lake
25
26
27
34
35
36
108D
147B
57B
135B
41F
85B
32A
117B
44B
151
68
41D
56A
36
148B
147D
44D
44E
35
57B
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 282


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
(Joins sheet 270)
(Joins sheet 281)
(Joins sheet 283)
(Joins sheet 292)
R. 6 E.
DRUMMOND ROAD
Spring Pond
Marl Lake
Nast Lake
water
D R U M M O N D
28
29
30
31
32
33
ROAD
44B
44D
85B
135B
147B
147D
36
57B
41D
151
124D
33
46B
106A
56A
101
152
123B

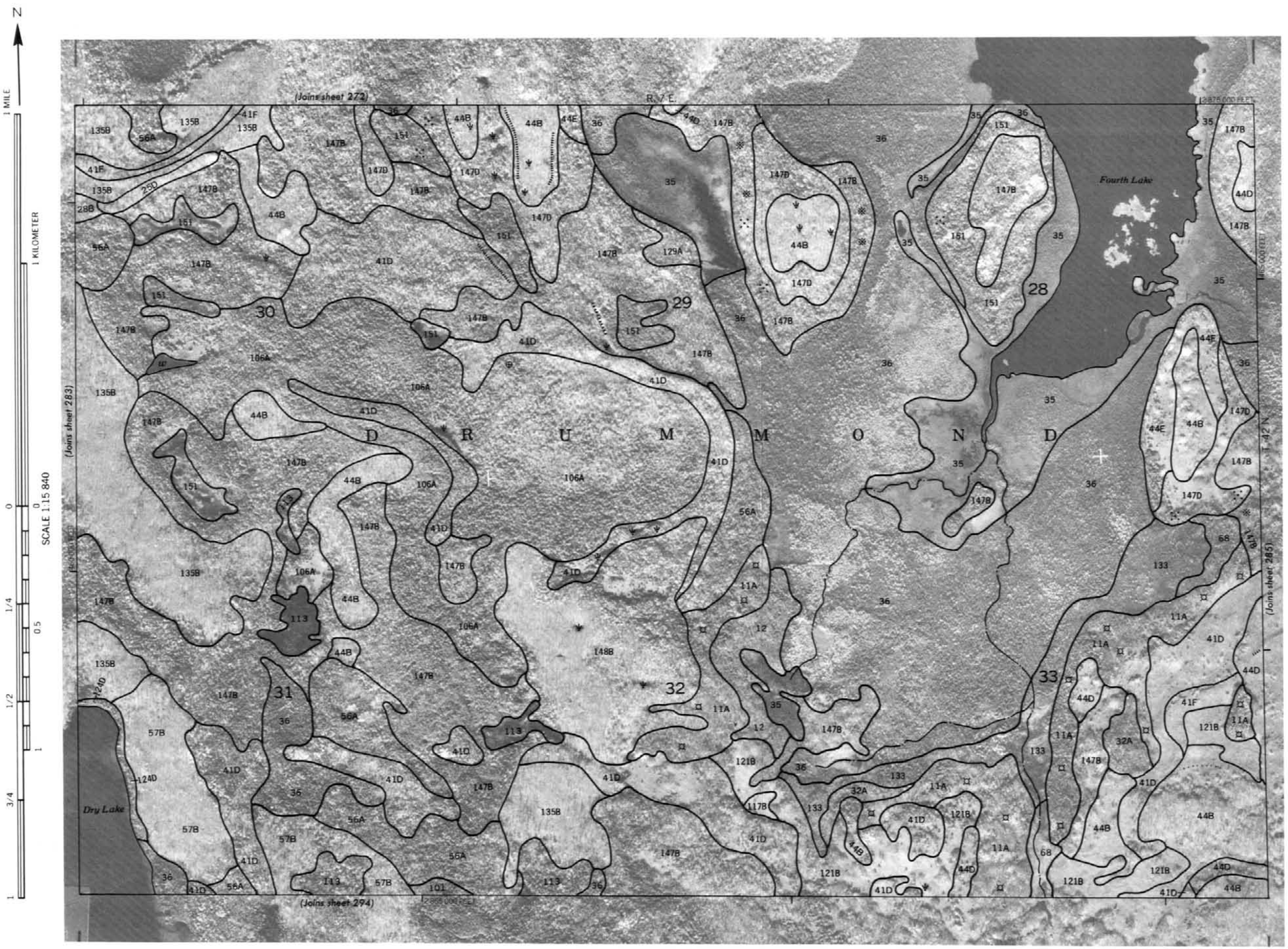
CHIPPEWA COUNTY, MICHIGAN NO. 282

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


283
N
(Joins sheet 271)
(Joins sheet 284)
(Joins sheet 293)
(Joins sheet 282)
R. 6 E.
27
26
25
34
35
36
D R U M M O N D
Loyal Lake
Dry Lake
41D
41F
56A
57B
101
106A
113
124D
133
135B
147B
151
152
28B
36
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 283

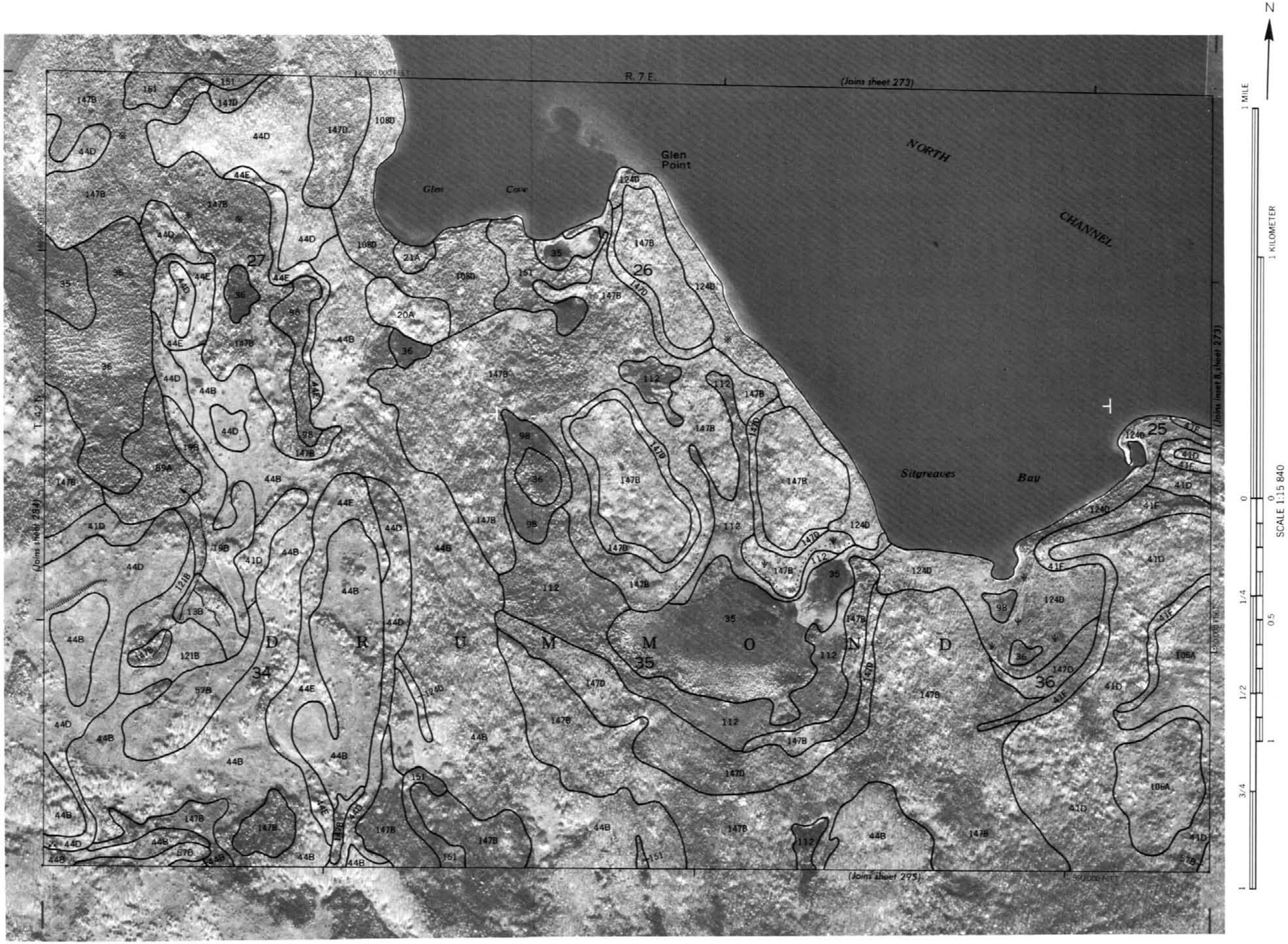

N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 272)
(Joins sheet 283)
(Joins sheet 285)
(Joins sheet 294)
R. V E.
T. 42 N.
Fourth Lake
Dry Lake
D R U M M O N D
28
29
30
31
32
33
135B
56A
41F
250
147B
151
147D
44B
44E
36
35
129A
44D
28B
56A
41D
106A
113
148B
11A
12
121B
117B
133
32A
68
57B
124D
101

CHIPPEWA COUNTY, MICHIGAN NO. 284

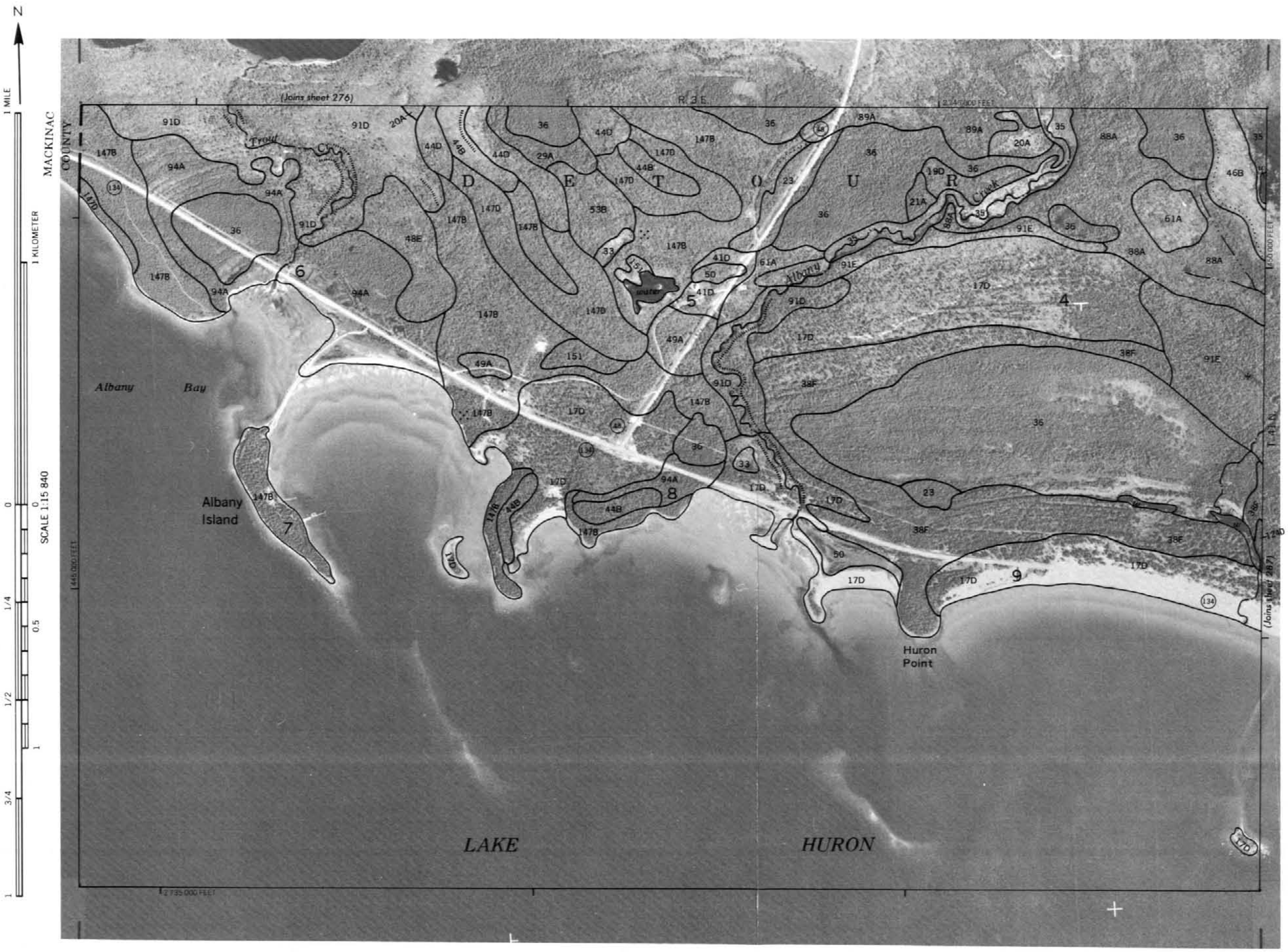
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981–1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 285


N
R. 7 E.
T. 42 N.
(Joins sheet 273)
(Joins sheet 284)
(Joins sheet 295)
(Joins inset B, sheet 273)
Glen Cove
Glen Point
NORTH CHANNEL
Sitgreaves Bay
DRUMMOND
27
26
25
34
35
36
147B
151
147D
108D
44D
44E
36
35
98
44B
21A
20A
108D
124D
112
41D
41F
19B
13B
121B
57B
89A
106A
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 286


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
(Joins sheet 276)
R 3 E
MACKINAC COUNTY
Trout Cr.
D E T O U R
Albany Creek
Albany Bay
Albany Island
Huron Point
LAKE HURON
(Joins sheet 287)
T 41 N
water
445 000 FEET
2 735 000 FEET
134
48
91D
94A
147B
147D
36
20A
44D
44B
29A
53B
33
151
41D
50
49A
48E
61A
21A
19D
23
35
38F
89A
88A
46B
91E
17D
4
5
6
7
8
9

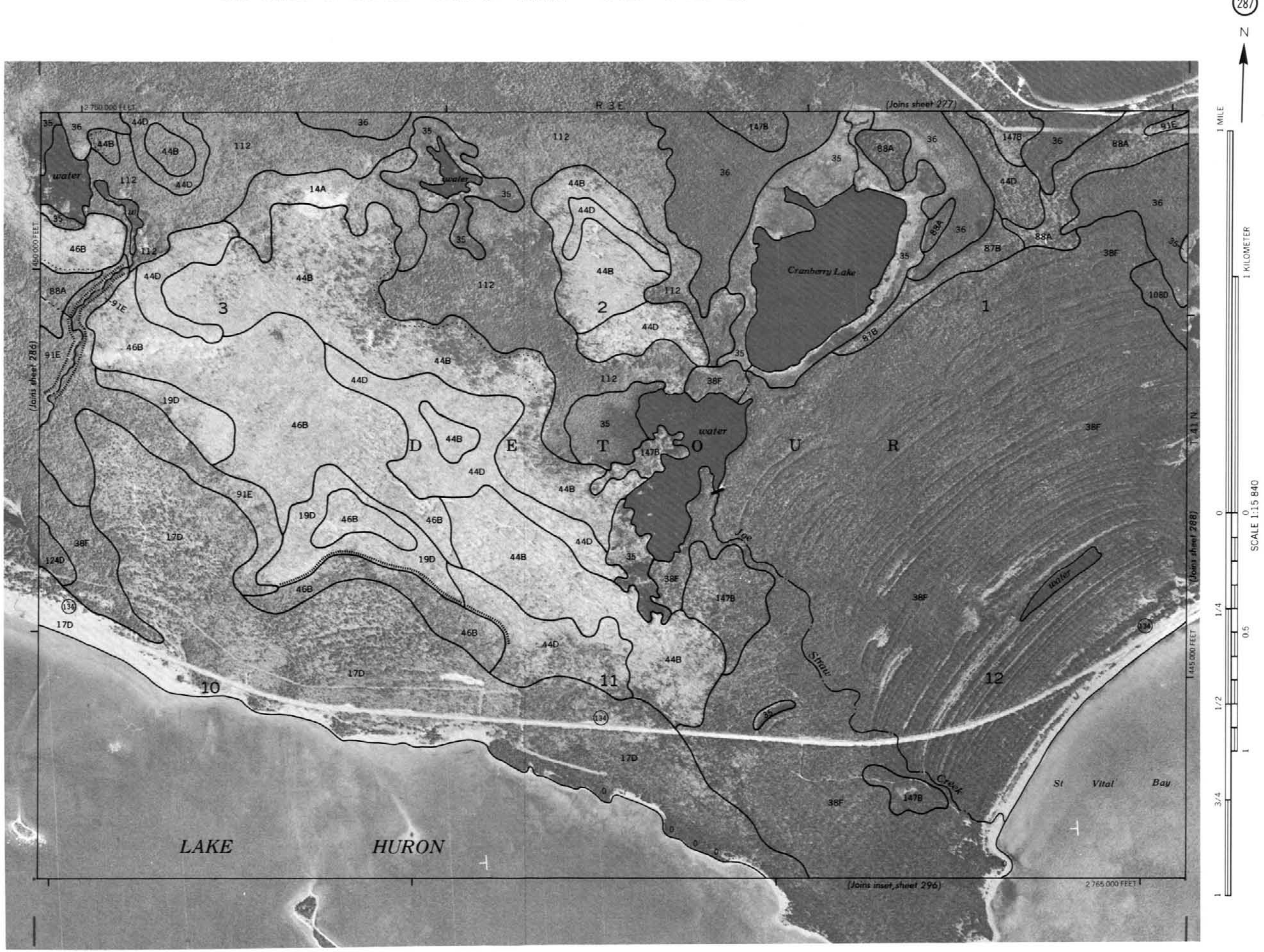
CHIPPEWA COUNTY, MICHIGAN NO. 286

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 287

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

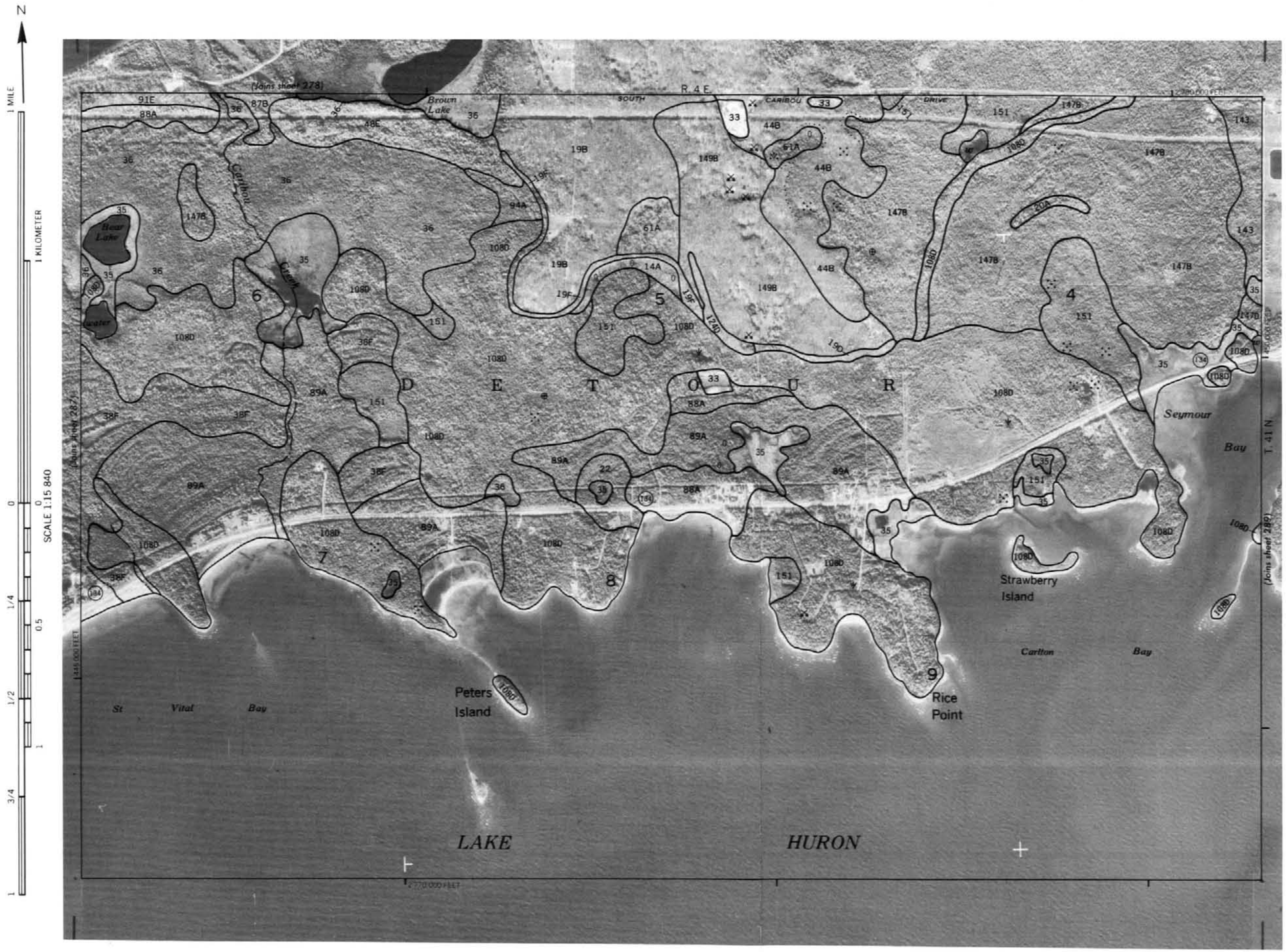
CHIPPEWA COUNTY, MICHIGAN NO. 287



(287)
N
R 3 E
T 41 N
2 760 000 FEET
2 765 000 FEET
450 000 FEET
445 000 FEET
(Joins sheet 277)
(Joins sheet 286)
(Joins sheet 288)
(Joins inset, sheet 296)
D E T O U R
Cranberry Lake
water
Joe Straw Creek
LAKE HURON
St Vital Bay
134
1 2 3 10 11 12
35 36 112 14A 44B 44D 46B 88A 91E 19D 17D 38F 124D 147B 87B 108D
1 MILE
1 KILOMETER
0 1/4 1/2 3/4 1
0 0.5 1
SCALE 1:15 840

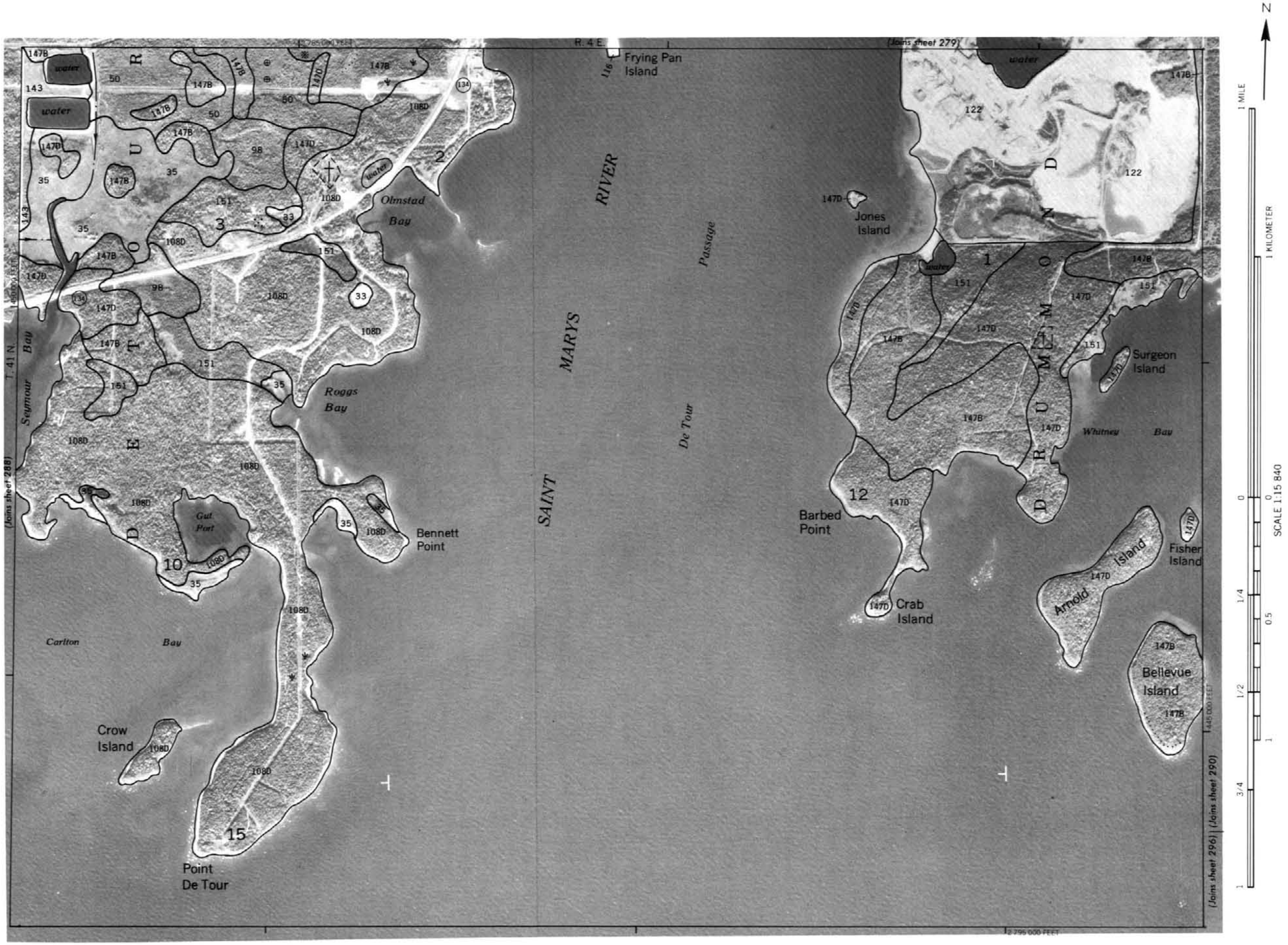
(288)

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 288


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 278)
R. 4 E.
SOUTH
CARIBOU
DRIVE
Brown Lake
Bear Lake
Caribou Creek
water
D E T O U R
(Joins sheet 287)
(Joins sheet 289)
T. 41 N.
Seymour Bay
Strawberry Island
Carlton Bay
Rice Point
Peters Island
St Vital Bay
LAKE HURON
2 770 000 FEET
445 000 FEET
134
4
5
6
7
8
9
91E
88A
36
87B
48E
33
44B
61A
149B
151
147B
143
108D
20A
35
19B
19F
94A
14A
124D
19D
38F
89A
22
88A

CHIPPEWA COUNTY, MICHIGAN NO. 288

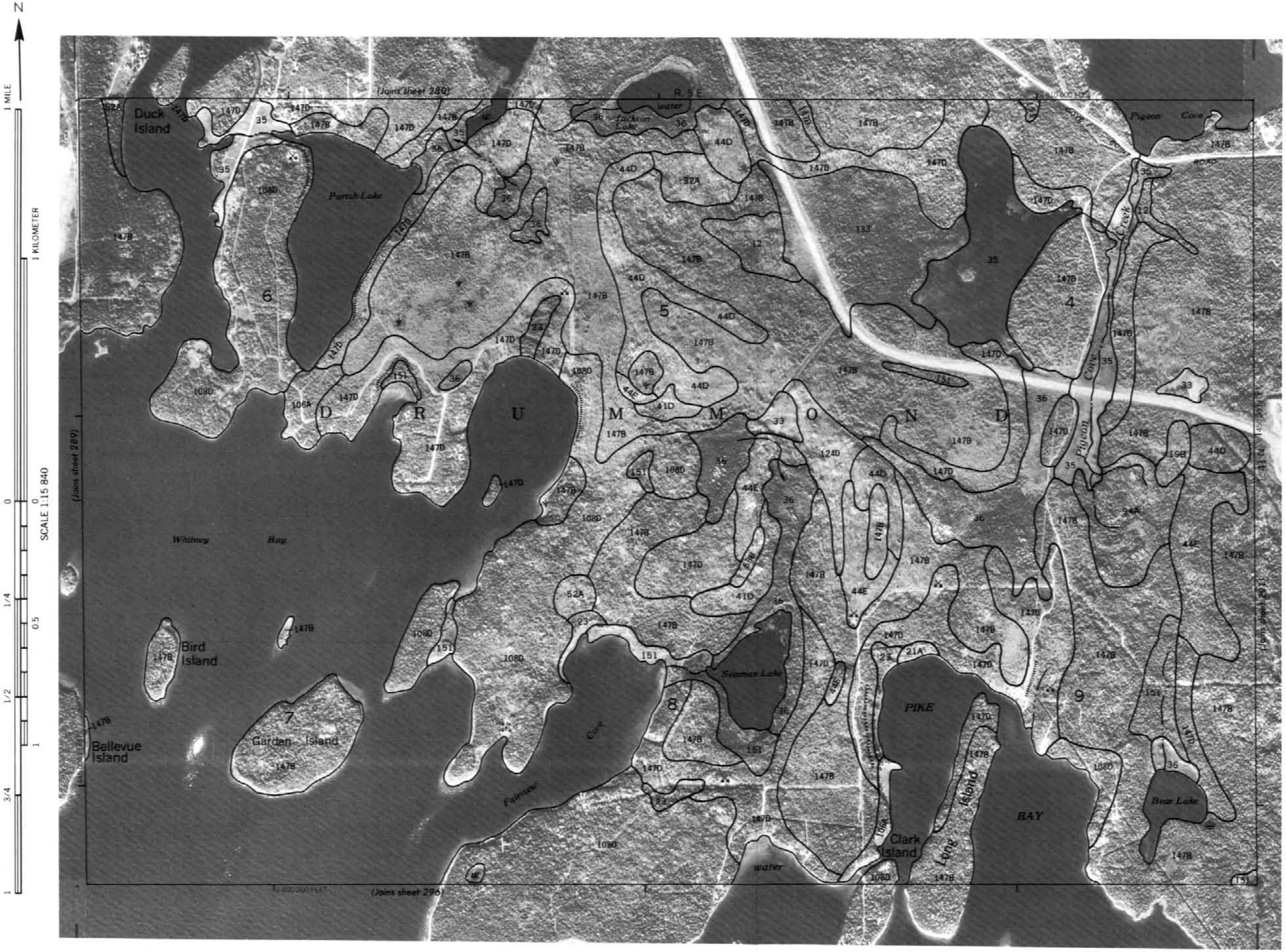
This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981- 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


Frying Pan Island
R. 4 E.
(Joins sheet 279)
(Joins sheet 288)
(Joins sheet 290)
(Joins sheet 296)
T. 41 N.
Seymour Bay
Olmstad Bay
Roggs Bay
Gut Port
Bennett Point
Carlton Bay
Crow Island
Point De Tour
ST. MARYS RIVER
De Tour Passage
Jones Island
Barbed Point
Crab Island
Surgeon Island
Whitney Bay
Fisher Island
Arnold Island
Bellevue Island
DETOUR
DRUMMOND
2
3
10
15
1
12
water
134
116
35
33
50
98
143
147B
147D
151
108D
122
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840
N

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

CHIPPEWA COUNTY, MICHIGAN NO. 289

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 290


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
(Joins sheet 280)
(Joins sheet 289)
(Joins sheet 291)
(Joins sheet 296)
R. 5 E.
Duck Island
Parish Lake
Jackson Lake
water
Pigeon Cove
Pigeon Creek
Whitney Bay
Bird Island
Garden Island
Bellevue Island
Seaman Lake
PIKE BAY
Clark Island
Long Island
Bear Lake
Fairview Cove
DRUMMOND
6
5
4
7
8
9
147B
147D
35
36
108D
44D
44E
52A
12
133
33
151
23
41D
106A
124D
19B
94A
21A

CHIPPEWA COUNTY, MICHIGAN NO. 290

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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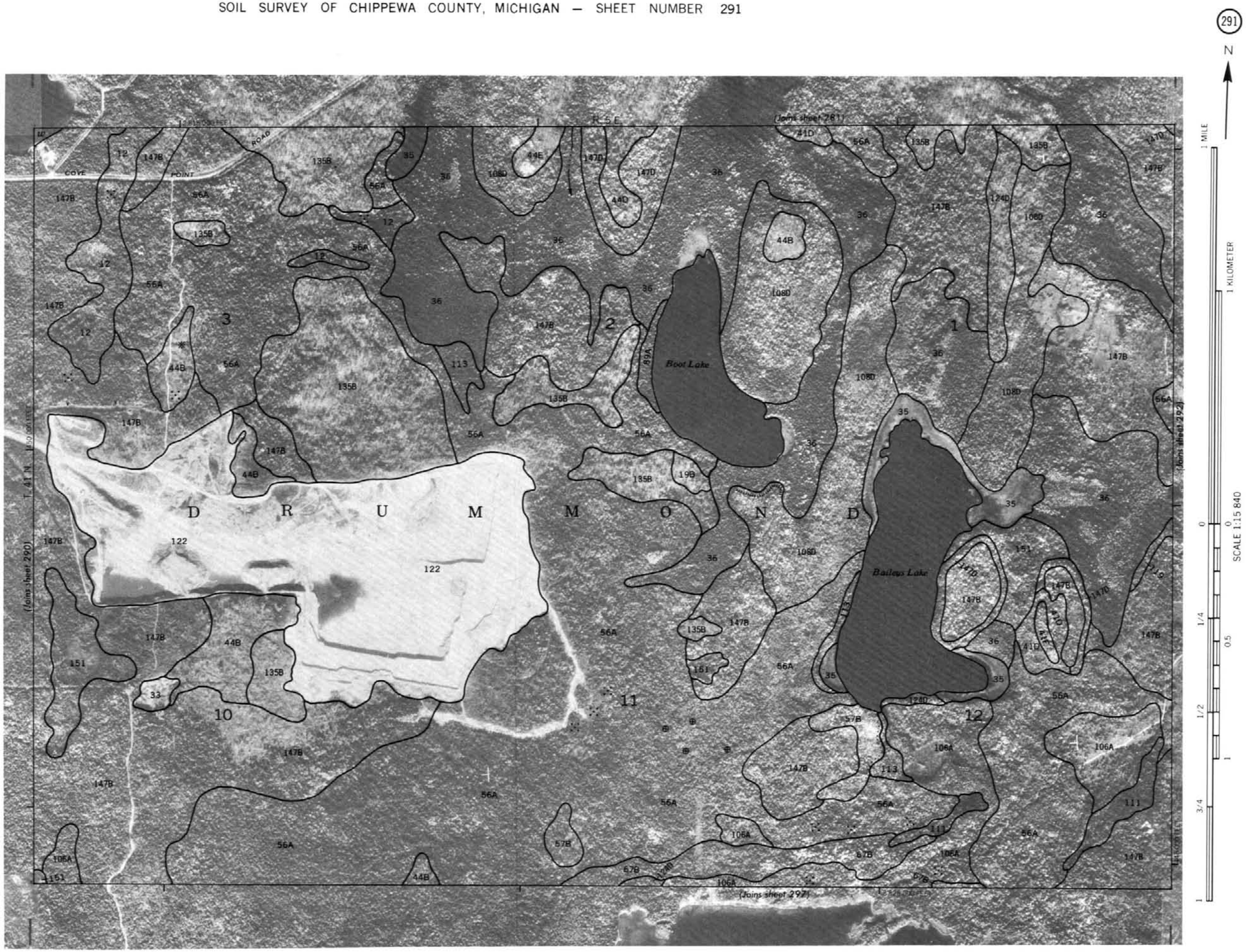
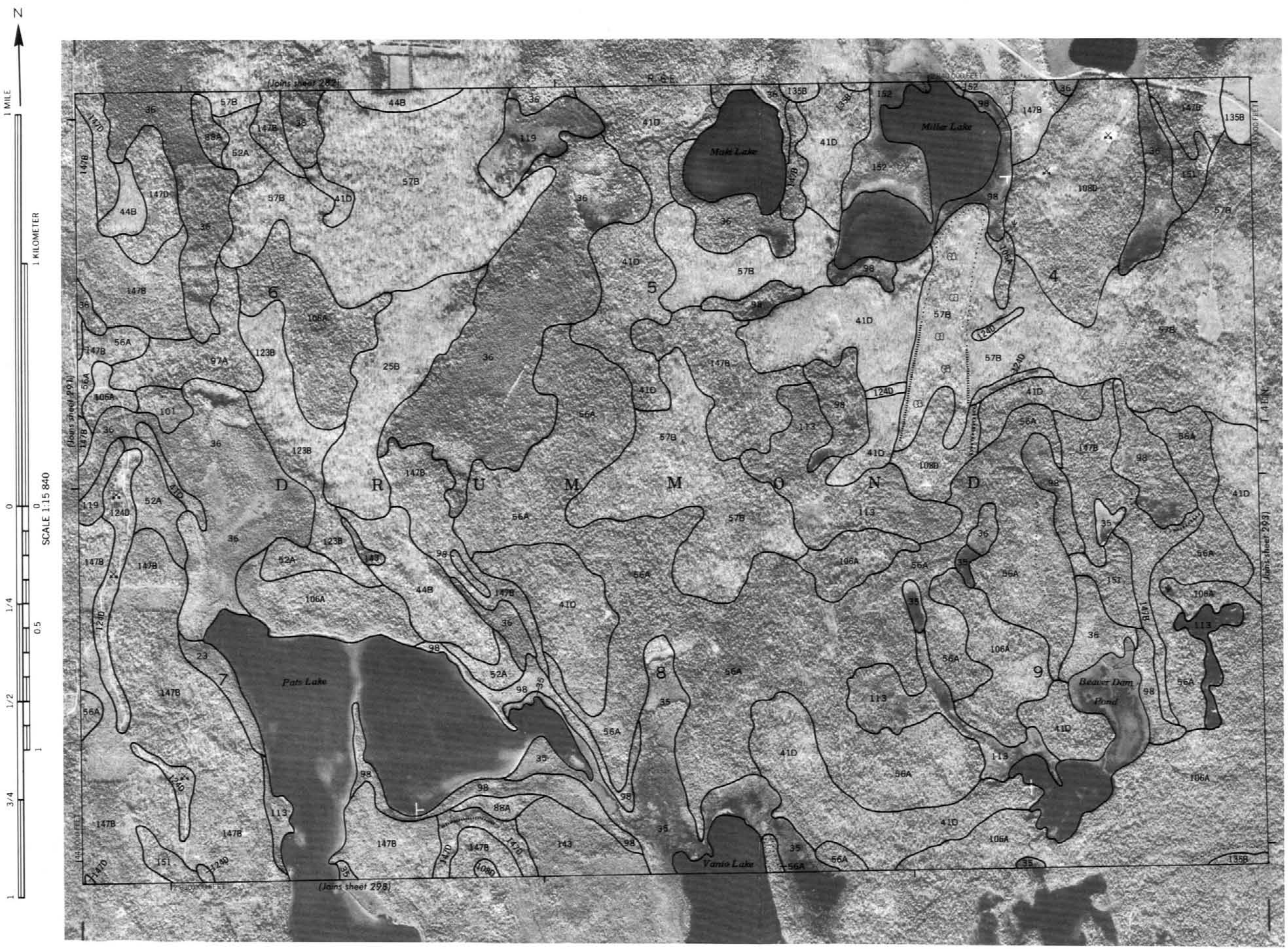
CHIPPEWA COUNTY, MICHIGAN NO. 291



291
N
(Joins sheet 281)
(Joins sheet 292)
(Joins sheet 297)
(Joins sheet 290)
R 5 E
T. 41 N.
COVE
POINT
ROAD
D R U M M O N D
Boot Lake
Baileys Lake
1
2
3
10
11
12
12
33
35
36
44B
44D
44E
56A
57B
67B
89A
106A
108D
111
113
122
124D
128D
135B
141D
147B
147D
151
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 292



292
N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0.5
(Joins sheet 282)
(Joins sheet 291)
(Joins sheet 293)
(Joins sheet 298)
R 8 E
T 41 N
D R U M M O N D
4
5
6
7
8
9
Mak Lake
Miller Lake
Pats Lake
Vanio Lake
Beaver Dam Pond
23
25B
35
36
41D
44B
52A
56A
57B
88A
97A
98
101
106A
108D
113
119
123B
124D
135B
143
147B
147D
151
152

CHIPPEWA COUNTY, MICHIGAN NO. 292

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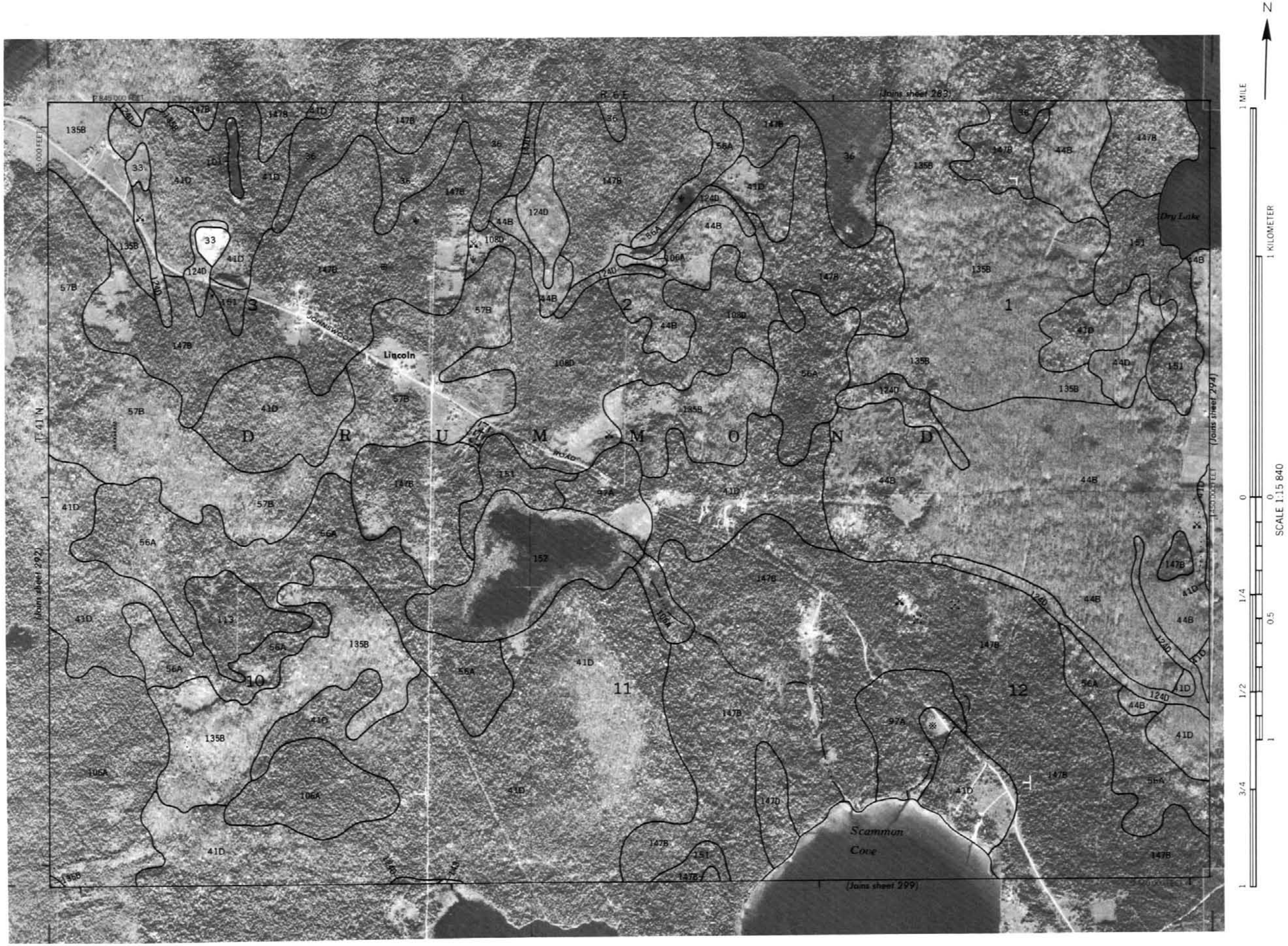
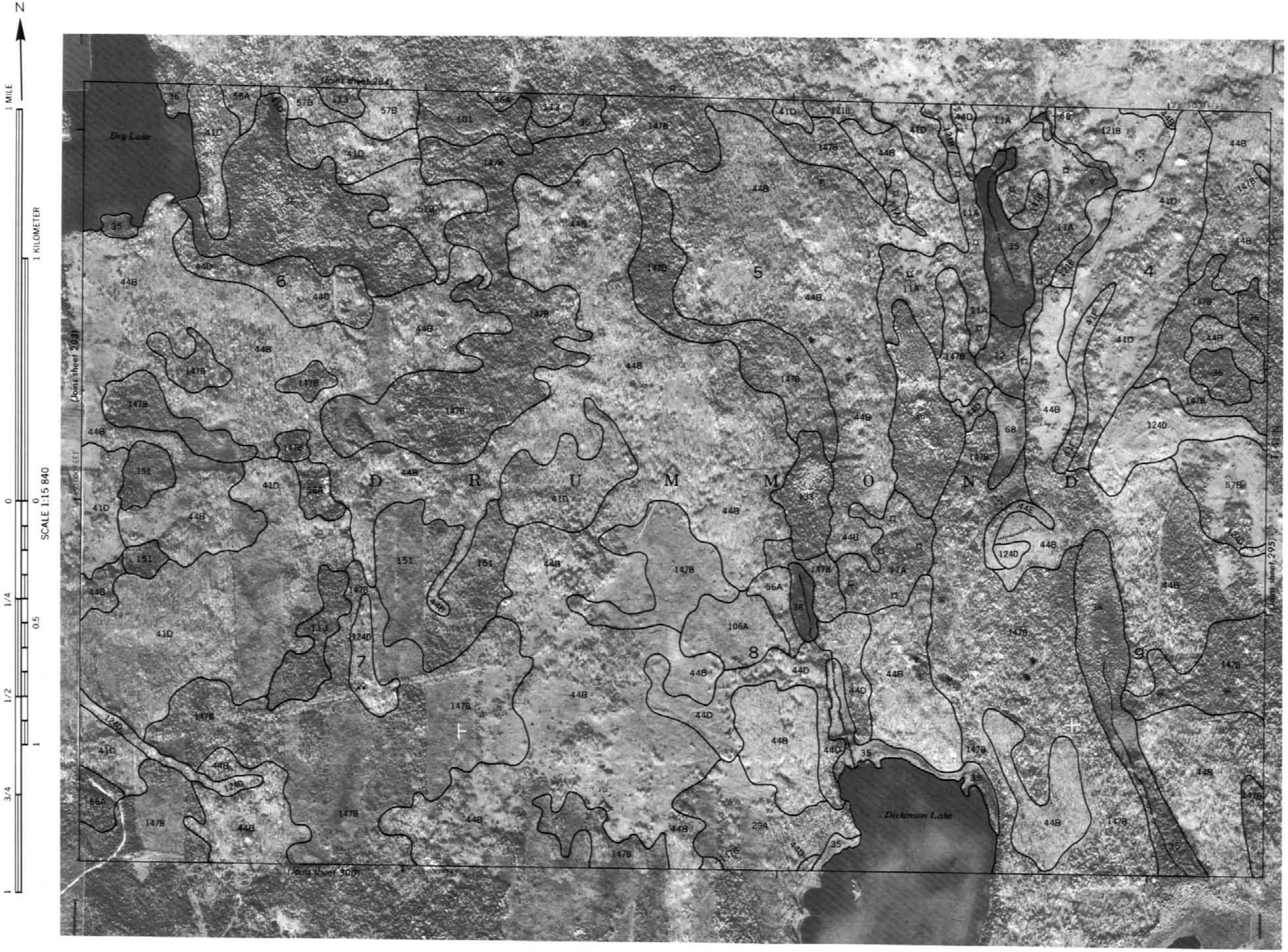
CHIPPEWA COUNTY, MICHIGAN NO. 293


N
(Joins sheet 283)
(Joins sheet 292)
(Joins sheet 294)
(Joins sheet 299)
R. 6 E.
T. 41 N.
DRUMMOND
Lincoln
Dry Lake
Scammon Cove
ROAD
1
2
3
10
11
12
135B
147B
41D
36
33
44D
124D
44B
56A
108D
106A
57B
151
152
97A
113
135B
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 294


N
1 MILE
1 KILOMETER
0
0
SCALE 1:15 840
1/4
0.5
1/2
1
3/4
1
(Joins sheet 284)
(Joins sheet 293)
(Joins sheet 295)
(Joins sheet 300)
R. 7 E.
Dry Lake
Dickinson Lake
D R U M M O N D
4
5
6
7
8
9
36
56A
41D
57B
113
101
147B
121B
11A
68
44B
44D
35
12
124D
151
106A
133
29A
44E

CHIPPEWA COUNTY, MICHIGAN NO. 294

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

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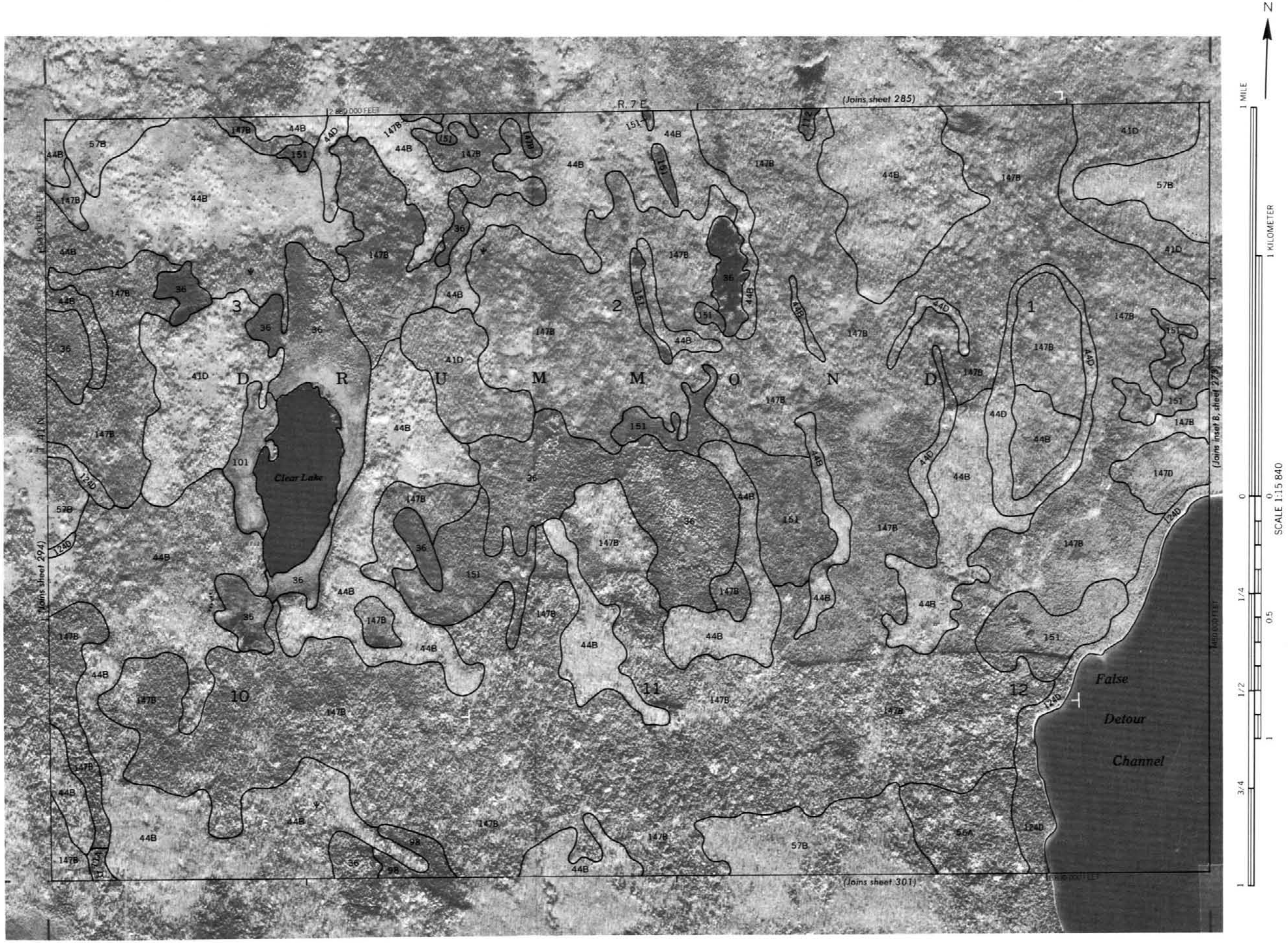
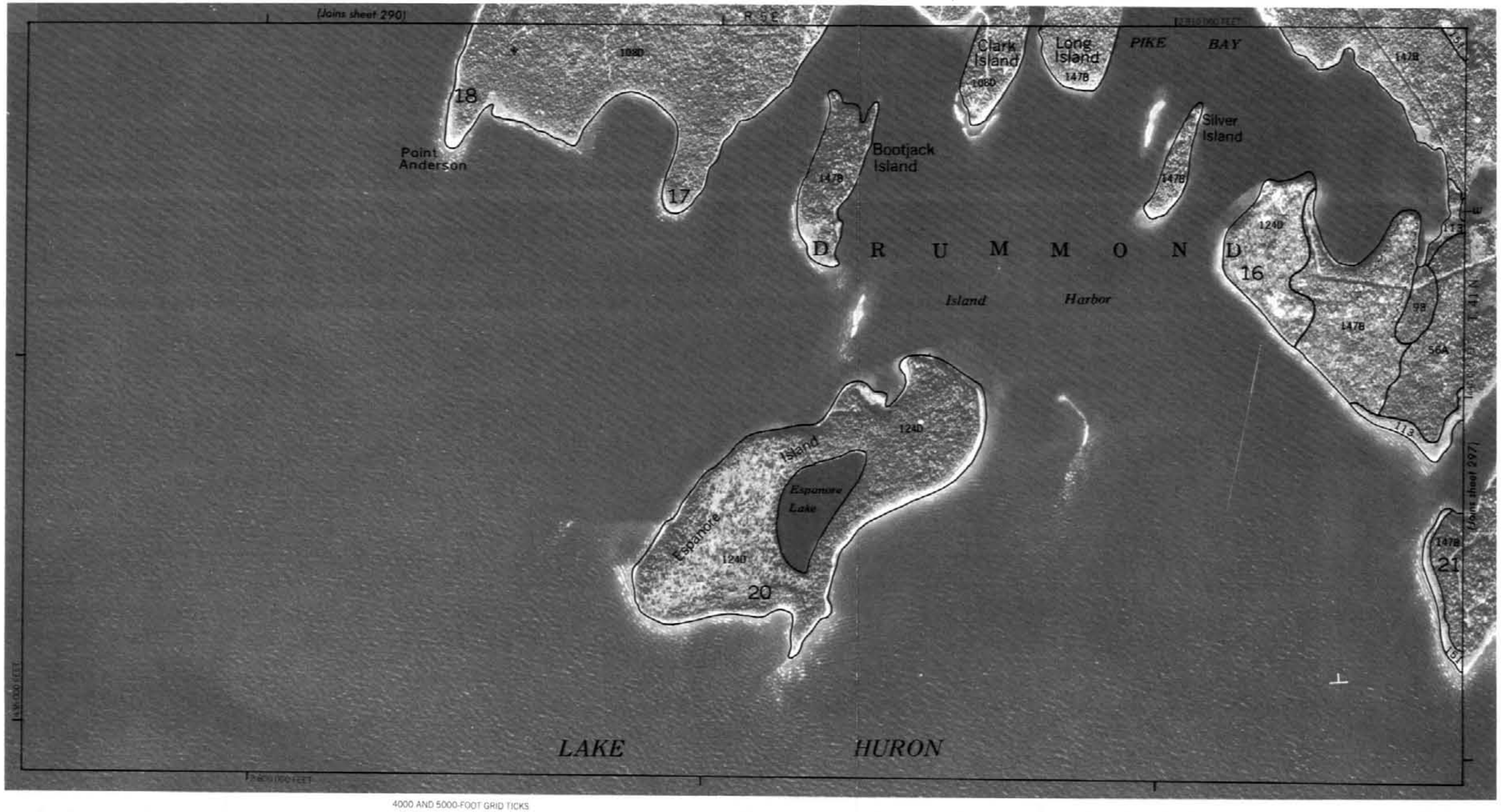
CHIPPEWA COUNTY, MICHIGAN NO. 295


N
(Joins sheet 285)
R. 7 E.
2 880 000 FEET
T. 41 N.
(Joins sheet 294)
(Joins inset B, sheet 277)
(Joins sheet 301)
D R U M M O N D
Clear Lake
False Detour Channel
1
2
3
10
11
12
36
41D
44B
44D
57B
96A
98
101
112
124D
147B
147D
151
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

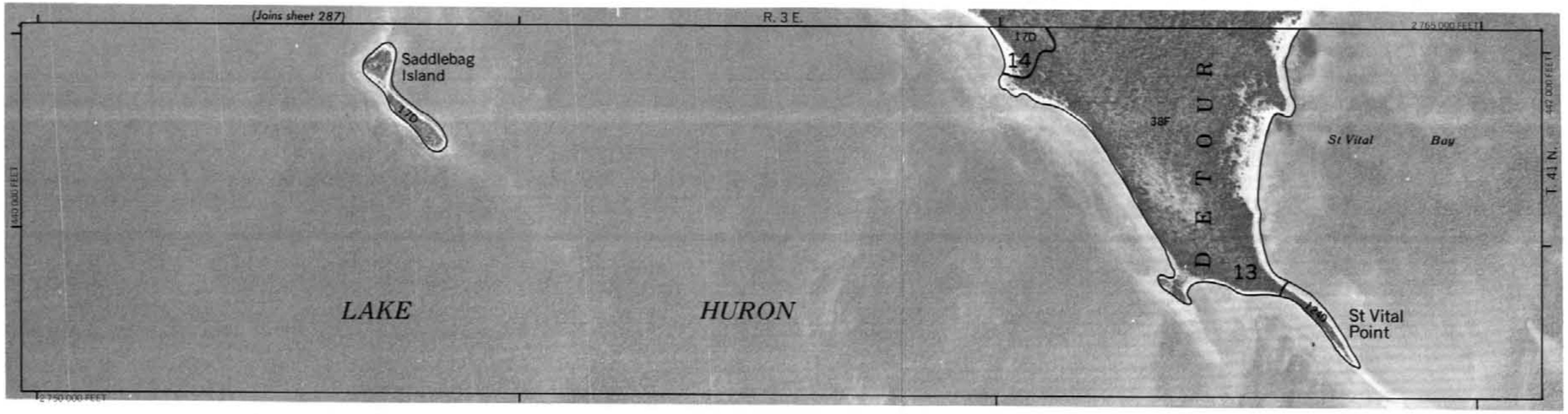
SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 296

296
N
1 MILE
1 KILOMETER
0
0
SCALE 1:15 840
1/4
0.5
1/2
1
3/4
1



(Joins sheet 290)
R. 3 E.
2 810 000 FEET
18
108D
Point Anderson
17
Clark Island
108D
Long Island
147B
PIKE BAY
147B
Bootjack Island
147B
Silver Island
147B
D R U M M O N D
Island Harbor
124D
16
147B
98
56A
113
113
T. 41 N.
(Joins sheet 297)
147B
21
151
124D
Island
Espanore
Espanore Lake
124D
20
LAKE HURON
440 000 FEET
2 800 000 FEET

4000 AND 5000-FOOT GRID TICKS



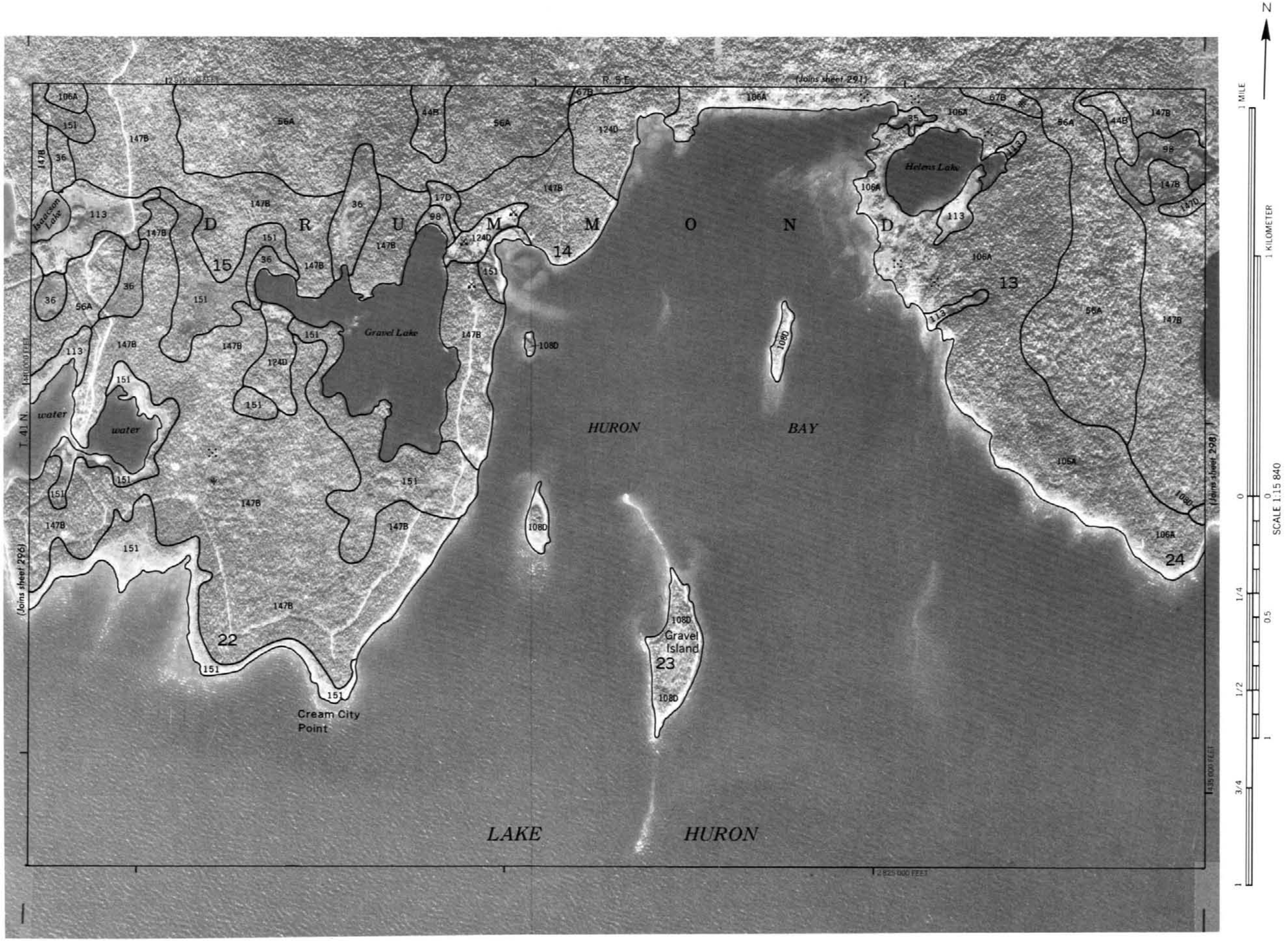
(Joins sheet 287)
R. 3 E.
2 765 000 FEET
Saddlebag Island
17D
17D
14
38F
D E T O U R
St Vital Bay
13
124D
St Vital Point
442 000 FEET
T. 41 N.
440 000 FEET
LAKE HURON
2 750 000 FEET

CHIPPEWA COUNTY, MICHIGAN NO. 296

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 297

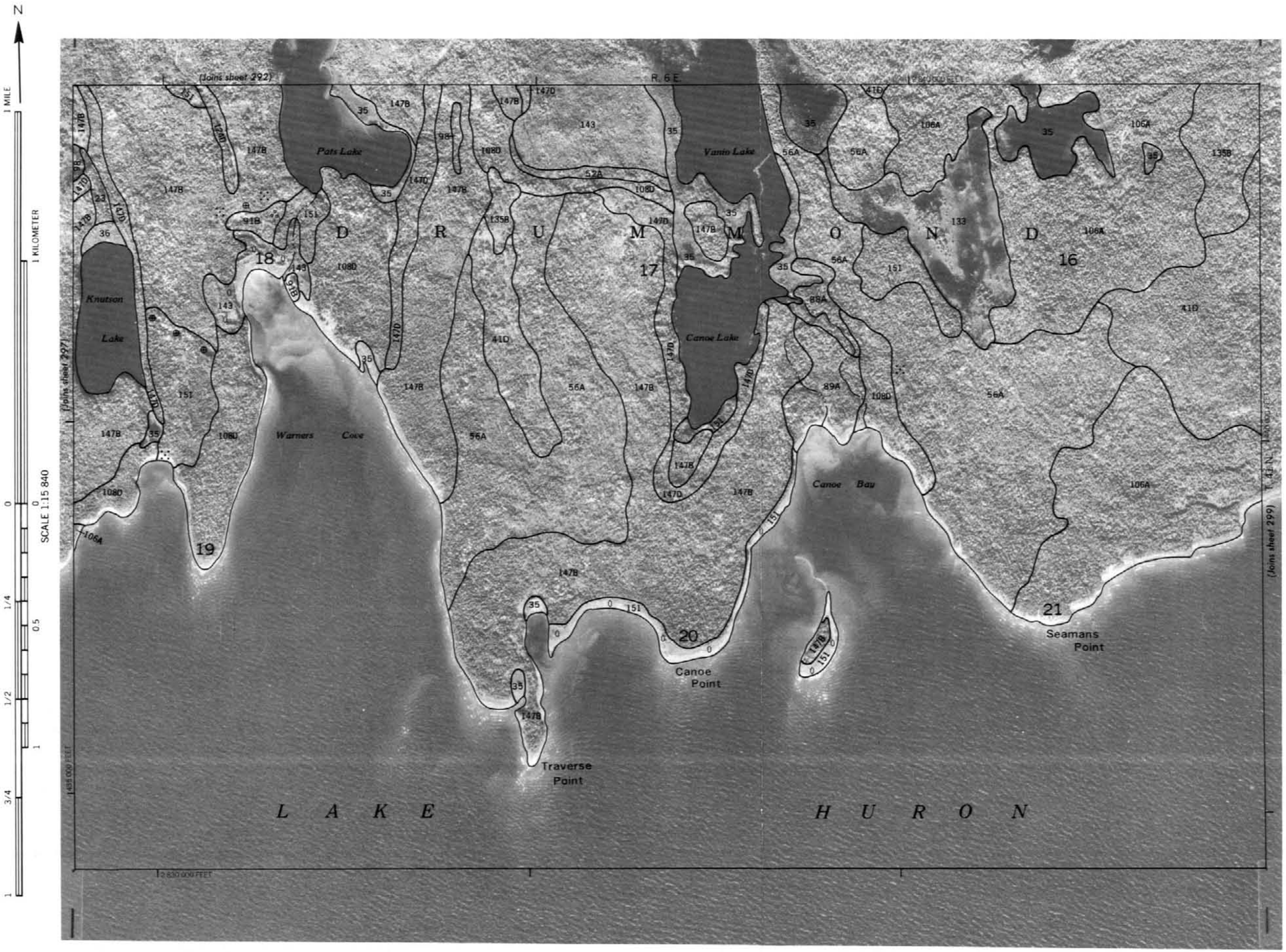
(297)


N
(Joins sheet 291)
(Joins sheet 296)
(Joins sheet 298)
R. 5 E.
T. 41 N.
2 825 000 FEET
435 000 FEET
D R U M M O N D
15
14
13
22
23
24
Isaacson Lake
Gravel Lake
Helens Lake
water
water
HURON BAY
LAKE HURON
Gravel Island
Cream City Point
106A
151
147B
36
113
56A
44B
67B
124D
17D
98
108D
35
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

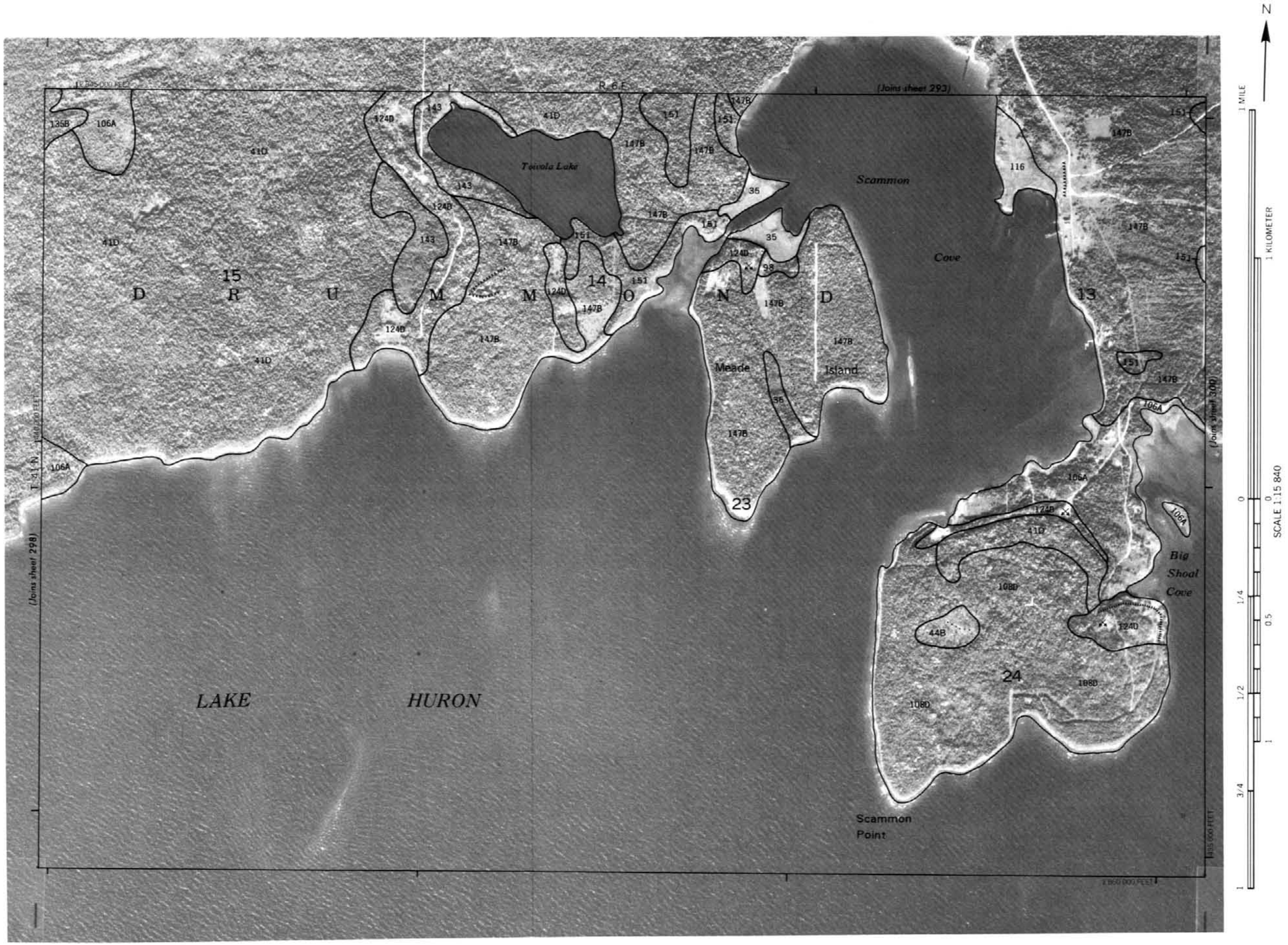
CHIPPEWA COUNTY, MICHIGAN NO. 297

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 298


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 292)
(Joins sheet 297)
(Joins sheet 299)
R. 6 E.
T. 41 N.
D R U M M O N D
L A K E
H U R O N
Pats Lake
Vanio Lake
Canoe Lake
Knutson Lake
Warners Cove
Canoe Bay
Canoe Point
Traverse Point
Seamans Point
16
17
18
19
20
21
35
36
41D
52A
56A
89A
91B
98
106A
108D
133
135B
143
147B
147D
151
23
2 830 000 FEET
485 000 FEET

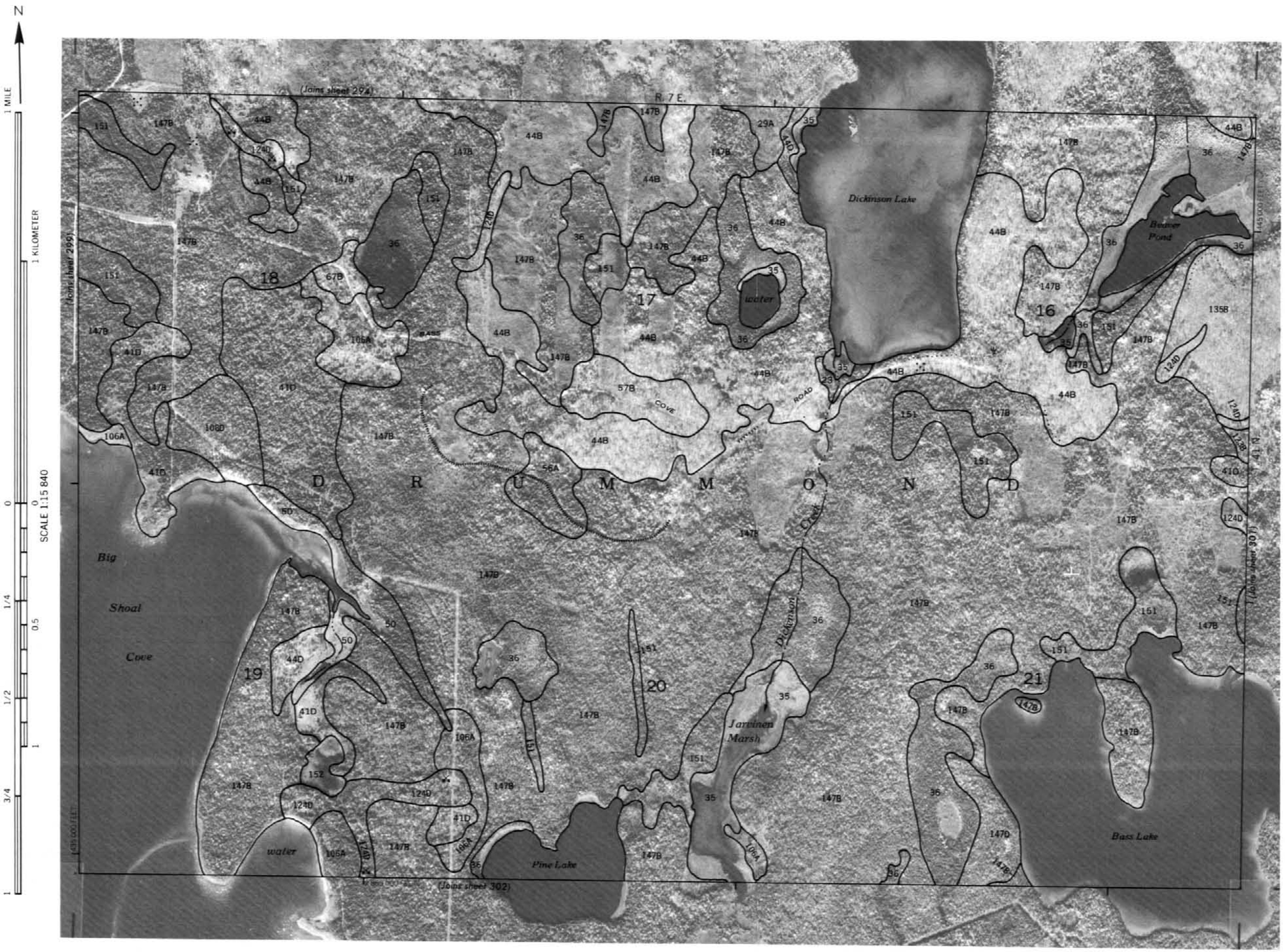
CHIPPEWA COUNTY, MICHIGAN NO. 298

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981-1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.


N
(Joins sheet 293)
(Joins sheet 298)
(Joins sheet 300)
R. 6 E.
T. 41 N.
Toivola Lake
Scammon
Cove
D R U M M O N D
15
14
13
23
24
Meade
Island
LAKE
HURON
Big
Shoal
Cove
Scammon
Point
135B
106A
41D
124D
143
147B
151
35
98
116
44B
108D
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

This soil survey map was compiled by the U.S. Department of Agriculture, Soil Conservation Service, and cooperating agencies. Base maps are prepared from 1981 - 1983 aerial photography. Coordinate grid ticks and land division corners, if shown, are approximately positioned.

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 300


N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
1/2
3/4
1
0
0.5
1
(Joins sheet 294)
R. 7 E.
(Joins sheet 299)
(Joins sheet 301)
(Joins sheet 302)
T. 41 N.
Dickinson Lake
Beaver Pond
water
Big Shoal Cove
Jarvinen Marsh
Dickinson Creek
Pine Lake
Bass Lake
BASS COVE ROAD
D R U M M O N D
16
17
18
19
20
21
151
147B
44B
124D
36
67B
106A
41D
108D
50
57B
56A
29A
35
23
135B
152
44D
147D
41D
151

CHIPPEWA COUNTY, MICHIGAN NO. 300

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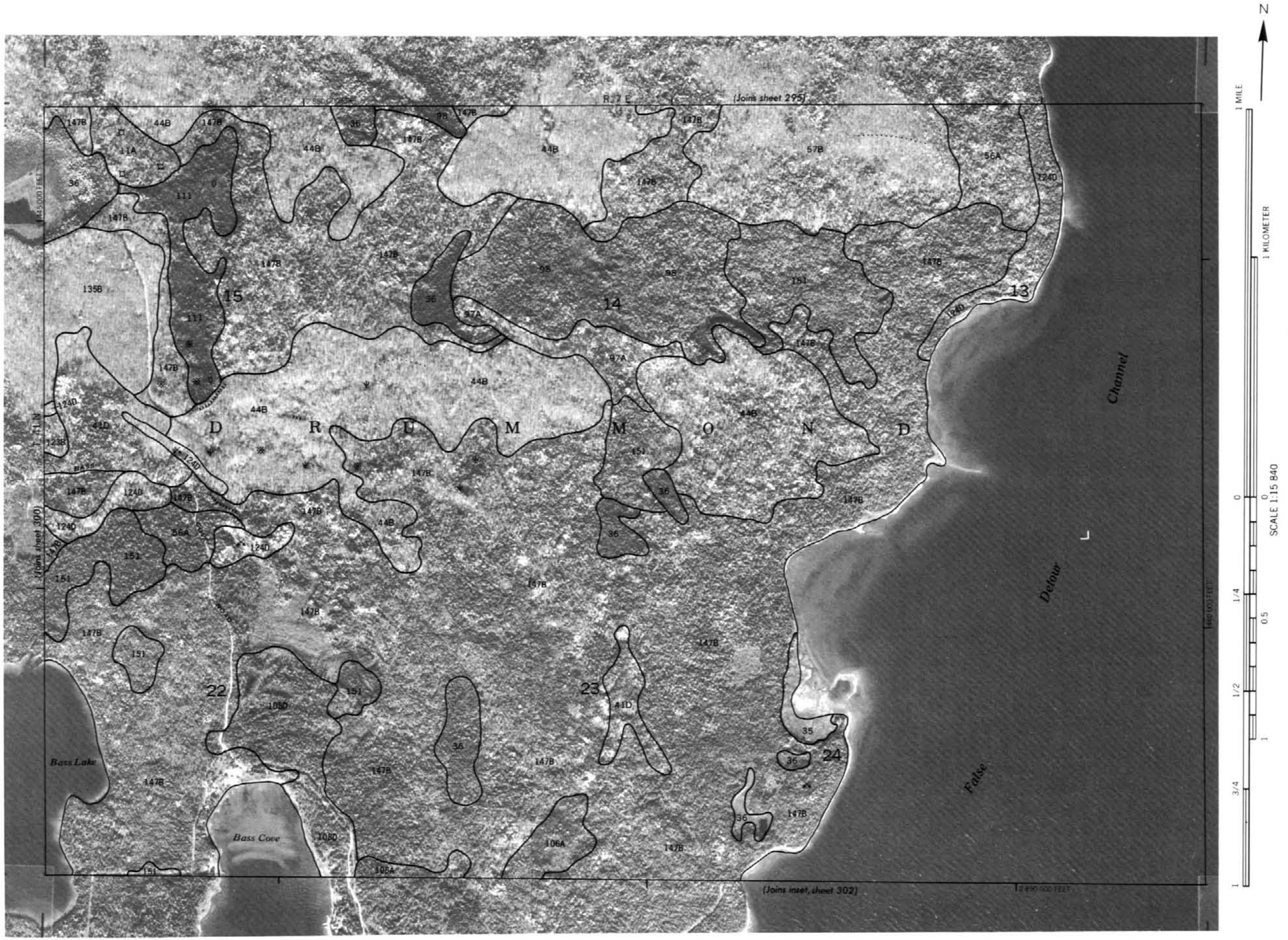
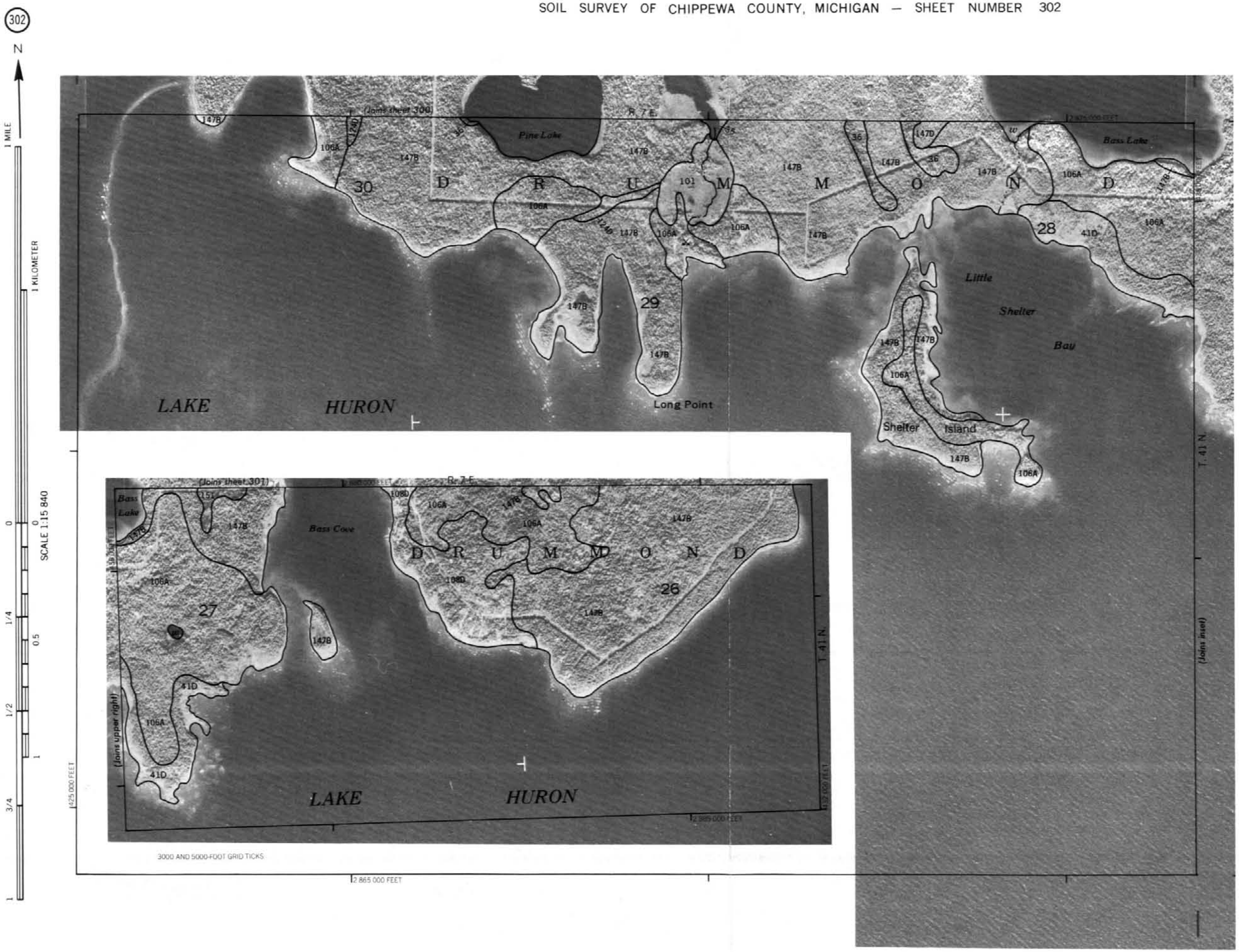
CHIPPEWA COUNTY, MICHIGAN NO. 301


N
(Joins sheet 295)
R. 7 E.
T. 41 N.
(Joins sheet 300)
(Joins inset, sheet 302)
D R U M M O N D
Detour Channel
False
Bass Lake
Bass Cove
15
14
13
22
23
24
147B
44B
11A
36
111
98
57B
56A
124D
135B
97A
151
41D
123B
108D
106A
35
1 MILE
1 KILOMETER
0
1/4
1/2
3/4
1
0.5
SCALE 1:15 840

SOIL SURVEY OF CHIPPEWA COUNTY, MICHIGAN — SHEET NUMBER 302



(302)
N
1 MILE
1 KILOMETER
SCALE 1:15 840
0
1/4
0.5
1/2
3/4
1
(Joins sheet 300)
R. 7 E.
Pine Lake
Bass Lake
D R U M M O N D
30
29
28
147B
106A
124D
101
36
147D
41D
Little
Shelter
Bay
Long Point
Shelter Island
LAKE HURON
T. 41 N.
(Joins inset)
(Joins sheet 301)
Bass Lake
Bass Cove
108D
151
27
26
(Joins upper right)
3000 AND 5000-FOOT GRID TICKS
2 865 000 FEET
2 985 000 FEET
425 000 FEET
432 000 FEET

CHIPPEWA COUNTY, MICHIGAN NO. 302

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